HEUFT

basic

Reference Handbook

Full Container Checks

Laning/Fluid

HBD200200 ENG Referenzhandbuch *basic*; englisch V8.00

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8.00	24.11.09	Translation of the original German version

This Reference Handbook may still contain misprints. However, its contents are checked at regular intervals and any necessary corrections will be incorporated into all following issues.

We reserve the right to make modifications which may become necessary due to technical progress.

Introduction

General

For many years HEUFT has set a high-quality standard in the field of inspection technologies controlled by microprocessors. All the technology used in our systems is the result of our own research and development. This ensures that all the components work together optimally. HEUFT *basic* is the synthesis of most modern technology and many years of experience in the packaging industry.

Contents of the Reference Handbook

The Reference Handbook is tailored for use by technical personnel (mechanics and electricians). It supplements the Operator's Manual for such customers which can assume the tasks of the HEUFT service because of their own technical department.

The structure of the Reference Handbook corresponds to the chronological order of the device life cycle. After the introduction, safety regulations and table of contents follow the chapters General Description, Mounting, Installation and Commissioning and thereafter the chapters Trouble Shooting, Maintenance and Shutdown. The appendix at the end includes a set of sample parameter sheets and the index.

How to use the manual

Carefully read the Reference Handbook before starting any kind of work at the device. The safety information must be strictly adhered to.

Independent from the intended use of the handbook we recommend that you first read the "General description" chapter to familiarise yourself with the terms used in the handbook and the parts of the device. Afterwards, depending on the requirements of the user, the sections Mounting, Installation, Commissioning, Trouble Shooting, Maintenance or Shutdown should be read.
The index which is part of the Appendix contains the keywords of all chapters and permits the rapid location of important items.

Scope of delivery

The device is supplied with one copy of the operator's manual in the language requested by the customer. The Reference Handbook is included when the customer has bought the device under the condition that he will assemble and install the device himself. The Reference Handbook is based on the assumption that the user is familiar with the basic knowledge provided by the Operator's Manual. If required, reference is made to the chapters of the Operator's Manual.

Further handbooks not included in the agreed scope of delivery can be ordered at the addresses stated on page 3 on the basis of the current prices.

Additional information

The HEUFT training department offers regular training courses to increase and train the knowledge provided by the Reference Handbook. The HEUFT service department is also available for customers which have their own technical department.

Pictographs

The pictographs used in HEUFT documentation simplify handling and point out dangers and particularities. They are subdivided into four groups:

Warning symbols

Danger
Warning of ionising radiation.

Danger
Warning of dangerous electrical voltage.

Danger
Warning of general dangers or X-radiation.

Danger
Automatic computer control
Warning of dangers due to computer controlled devices.

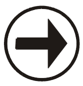
Danger
Warning of rotating cylinders.

Prohibitive symbols

Stop
Damage to the device.

Information symbols

Information
Device malfunction.



Comment
Recommendation for device operation.

Documentation symbols

Example
For a better understanding.

⇒

Please refer to
Reference to another chapter or section.

Safety information

This section lists all safety regulations applicable for the HEUFT *basic* devices Full container checks and Laning/Fluid. If a safety regulation is only applicable to individual devices or components, the name of the corresponding component is given in brackets. Every safety regulation is also provided at the appropriate position in the Reference Handbook.

The device must only be used for the purpose for which it has been intended!
Instructions relating to mounting, installation and maintenance or repair:
Stop the conveyor and lock it out to prevent inadvertent switch-on! Clear the conveyor in the detection area.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

Danger of electric shock!
Disconnect the mains power supply cable according to the German standard DIN VDE 0105 before working at parts with live voltage:

- Cut the voltage of the supply cable.
- Secure it to prevent it being inadvertently switched on e.g. by removing the fuses or applying a prohibitive sign!
- Check the dead voltage condition e.g. with a voltmeter.

Danger of electric shock when installing or dismounting the mains cable!
Electricians only are authorized to do work at the power supply cable! Switch-off the voltage of the power supply cable according to DIN VDE 0105. When interrupting the installation work, recheck the dead voltage condition of the mains power supply cable before resuming work.

Danger of electric shock!
Only electricians are authorised to open the control unit.
Switch the device off with the main power switch before opening.
After switch-off with the main power switch, the power supply cable has still live voltage! Live voltage of 230 V (115 V) at several locations within the device. These locations are shockproof (IP 20).
Electricians only are authorised to replace electrical components while adhering to the applicable safety regulations!

Radioactivity! (Fill level detection Gamma and Residual liquid detection Gamma)
Close the radiation window with both shutter switches. Do NOT put your hands in the radiation area unless the green light is on (shutter closed). The orange light (in GB: red) is out in this case.
ONLY persons trained and licensed by HEUFT Company for repair of radioactive devices are authorised to open the measuring bridge.
Customer personnel are not authorised to open the measuring bridge on the radiation side!
If desired, the especially trained HEUFT service personnel will carry out mounting and installation.
Special care must be taken during the installation and test of the shutter control circuit (closure of the radiation area)!
Manipulations at the radiation source are prohibited. ONLY persons trained and licensed by HEUFT Company for the repair of radioactive devices are authorised to repair a defective radiation unit.
Dismounting and shipping of the Gamma measuring bridge is prohibited!
Never operate the measuring bridge without the receiver. Otherwise, gamma radiation can penetrate through the measuring bridge without any obstruction!
Operating the Gamma fill level detection or the Gamma residual liquid detection without permission or protection devices is prohibited!

X-radiation! (X-ray fill level detection)
Close the radiation window with both shutter switches. Do NOT put your hands in the radiation area unless the green light is on (shutter closed). The orange light (in GB: red) is out in this case.
ONLY persons trained and licensed by HEUFT Company for repair of X-radiation devices are authorised to open the measuring bridge.
Customer personnel are not authorised to open the measuring bridge on the radiation side!

If desired, the properly trained personnel of the HEUFT service will carry out mounting and installation.
Special care must be taken during the installation and test of the shutter control circuit (closure of the radiation area)!
Manipulations at the radiation source are prohibited. ONLY persons trained and licensed by HEUFT Company for the repair of x-radiation devices are authorised to repair a defective emitter unit.
The measuring bridge must not be operated without a functioning receiver, otherwise X-radiation can pass the measuring bridge without attenuation!
Operating the x-ray fill level detection without permission or protection devices is prohibited!

X-radiation! (X-ray fill level detection)
Improper use of the module and the removal of protection devices may result in an increased intensity of X-radiation. A device modified in such a way no longer meets the approval requirements and it is consequently prohibited to operate such a device.

Overpressure! (rejector)
The supply pressure of the compressed-air supply line to the rejector must not exceed 10 bar.
Shut off the compressed air at the stop valve for maintenance work! Only remove the protective cover when the manometer displays 0 bar!

Broken glass! (rejector)
When rejecting into a glass waste container, take care that all glass fragments of the rejected bottles fall into the container.

Maintenance is only permitted when production is not in progress and the main power switch is off.

When mounting, dismounting or adjusting the sensors, switch-off the filler, closer or labeller, in case of block operation switch-off the filler **and** the closer **and** the labeller, and lock-out these machines to prevent inadvertent switch-on!
The safety regulations must be observed!

When mounting the machine sensors, switch-off the conveyor, the filler, the closer **and** the labeller and lock them out to prevent inadvertent switch-on!
The safety regulations must be observed!

The area around the bore holes for adhesive dowels must be dry. Dampness prevents the plugs from binding.

Do not carry out the installation unless the conveyor is stopped! Secure the conveyor to prevent it being inadvertently switched on!

Moving parts! (rejector)
Danger from moving rejector elements. The segments or buffers of the rejector may start moving without an obvious reason from the outside. Do not place hand in the operative range of the rejector!
Always shut off the compressed air at the stop valve when working at or in front of the rejector and secure the stop valve to prevent it being inadvertently switched on!

Automatic computer control
Danger from moving segments of the rejectors DELTA-FW and DELTA-K when the supply power is switched on or off or when switching between the stand-by mode and the operating mode.

It may be possible that the rejector segment of the *mono* or *flip* or the rubber bumper of the *pusher* extend when establishing the air connection!

A conveyor or machine must be switched on for the measurement of parameters. Adhere to the safety regulations!

STOP

When attaching the device to the conveyor it must be ensured that no movable parts (e.g. chain holders, deflection pulleys etc.) are jammed or damaged.

STOP

When attaching the sensors in and to the machines the mounted parts should not block or damage moving machine parts such as hold-down devices in the filler, deflection pulleys, and so on.

STOP

Supply lines installed within the conveyor or in its side frames such as cables or lubrication lines must be placed so that they run either below the conveyor or at its lower edge.

STOP

When opening the control unit, take care that the front panel is moved slowly and with manual support in order to avoid damage to the hinge mechanism.

STOP

Never clean the device with a jet of water or other liquids. Penetrating moisture can cause damage to the electronics.

STOP

When the drive shafts of encoder and conveyor are not correctly aligned, the unbalanced mass at the encoder shaft will cause the destruction of the encoder.

STOP

Closure detection HEUFT *sonic*: In order to protect the *sonic* sensor, the microphone opening must be closed with the protection cap during device maintenance.
It is of vital importance that no water enters the lower opening of the sensor!

Protection device

Protective plate (DELTA-FW rejector)

During rejector operation the contact protection must be installed opposite to the rejector segments. It is prohibited to operate the rejector without the protection device!

Device information

Application

The devices have been designed for the inspection of products without touching them and the automatic rejection of faulty units.

The *basic* devices for **Full container checks (BA)** also provide the option for a simultaneous monitoring of fillers, closers or labellers in bottling halls.

In contrary, the *basic* device **Laning/Fluid (VF)** is designed for the detection of residual liquid prior the filling process, the acceptance of signals from customers' devices and the distribution of containers to 2 lanes.

The devices are not to be used for container checks in potentially explosive areas.

The device has been designed exclusively for industrial and commercial purposes.

The devices must not be used for other purposes than those for which they have been designed.

Ambient conditions

The device has been designed for the following ambient conditions:

Air temperature:	5° to 40° centigrade
Air humidity:	30% to 95% relative air humidity, non-condensing

The limit values cover the requirements of the German standard DIN EN 60204-1:2007.

DIN EN 60204-1:2007 corresponds to the classifications

EN 60204-1:2006
IEC 60204-1:2005

Sudden fluctuations in temperature should be avoided as they could result in condensation forming.

Avoid strong sunlight because it can heat up the casings or cause malfunctions of the optical check devices.

Technical specifications

Characteristics

Maximum transport speed:	1.5 m/s
Maximum output:	72,000 containers per hour
Maximum container height:	350 mm
Fill level range:	30 - 280 mm (for X-rays: 70 - 220 mm)

Electrical system

Demands on the electric power supply

Mains:	single-phase alternating current (L, N, PE)
Wiring:	TN-S mains according to IEC 60364-4-41 / DIN VDE 0100-410
Nominal voltage:	230V +/-10%, 240V +6%/-10%, 115V +/-10%
Frequency:	50/60 Hz
Maximum continuous current:	230V: 1.5 A (apparent current)
	115V: 3.0 A (apparent current)

Max. constant power:	Output: 72,000 containers per hour 150 W (active power) 300 VA (apparent power) Note: The apparent power is used to conceive the preceding means of production (e.g. transformer, uninterruptible power supply). The active power describes the power consumption.
Fuse protection provided by the customer:	16 A gG/gL fuse Note: Fuses are stipulated in order to protect the main power switch. Circuit breakers do not limit the maximum current sufficiently.
Maximum connectable conductor cross section:	Maximum conductor cross section: 3x2.5 mm² (terminals, main power switch) Note: The cross section of the feed line is to be selected by the customer in accordance with IEC60364-5-523 / DIN VDE0298-4. The method of installation, the type of cable, temperatures, cable accumulation and the number of loaded wires must be taken into consideration in addition to the fuse protection stipulated. A subdistributor must be provided near the device if the determined conductor cross section exceeds the specified maximum connectable conductor cross section, unless there are other measures that can be taken.

Power supply specification according to DIN EN 60204-1:2007 / EN 60204-1:2006 / IEC 60204-1:2005:

Permanent voltage deviation	
Nominal voltage of 115V:	±10% nominal voltage
Nominal voltage of 230V (400V):	±10% nominal voltage
Nominal voltage of 240V (415V):	+6%, -10% nominal voltage*
Power frequency deviation:	
Permanent:	±1% rated frequency
Momentary:	±2% rated frequency
Voltage type:	sinus
Harmonic oscillations, harmonic distortion**	
Total of 2nd to 5th harmonic oscillation:	≤ 10%
Total of 6th to 30th harmonic oscillation:	≤ 2%
Voltage cutoffs:	≤ 3 ms (max. one time per second)
Voltage drops:	≤ 20% peak voltage for maximum 1 period (max. one time per second)

* This information complies with the recommendation of CENELEC HD472-S1.

** These values describe the ratio between the effective voltage of the indicated harmonic oscillations and the total effective voltage.

Compressed-air supply

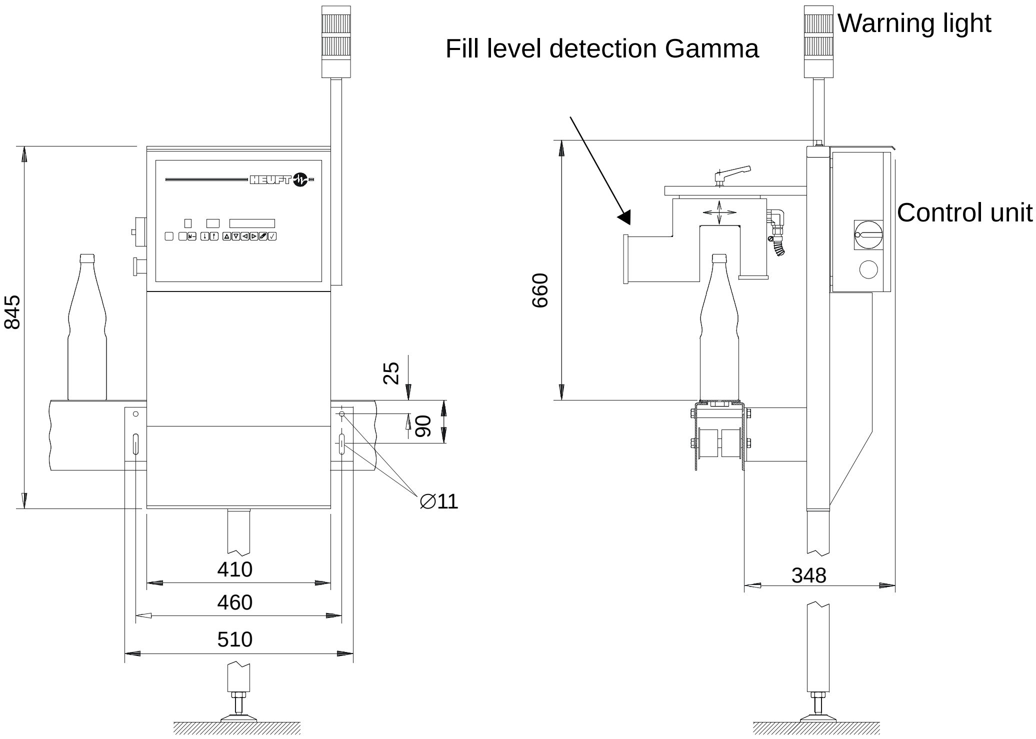
Compressed air for the rejector min./max.:	6 bar / 10 bar
Air connector cross section:	1/2 inch

System of protection

According to the specification IEC 60529, the complete device is assigned to the protection class IP 65 (dust tight and protected against water jets).

Mechanics

dimensions



Weight:	between 35 and 45 kg

Noise emission

The individual HEUFT rejectors emit an equivalent continuous sound level below 85 $dB_{(A)}$. The customer must avoid any inadmissible addition of noise levels when planning and installing the HEUFT devices.

EMC-protection (electromagnetic compatibility)

This device was manufactured according to the valid EMC-standards and is a class A device. It fulfils the limit values for industrial environments and is not designed for domestic application. Improper use or modifications to the device may cause malfunctions.

Radiation emission

Only applicable for a fill level detection Gamma or X-ray or a residual liquid detection Gamma!

The radiation protection tests carried out by the "Landesamt für Umweltschutz und Gewerbeaufsicht Rheinland/Pfalz" (local authority for environmental protection) for the fill level detection Gamma and the residual liquid detection Gamma and by the "Physikalisch Technische Bundesanstalt" (Federal Institute for Physics and Engineering) for the fill level detection, X-ray proved the correspondence with the radiation protection regulations. The fill level detections Gamma and X-ray as well as the residual liquid detection Gamma meet the requirements for the qualification approval and from the radiological point of view there are no reservations against their adequate use.

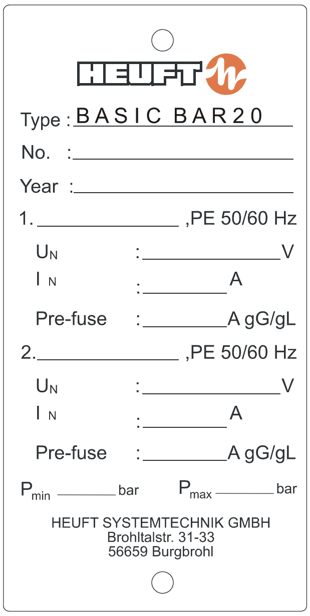
In most countries a special approval given by the governmental authorities in charge is required for the operation of a device with a radioactive source or an X-ray generator. In some countries an additional radiological safety officer is prescribed for the operating factory.
HEUFT SYSTEMTECHNIK GMBH will support the customer with documentation necessary to obtain such permission.

Should this device be exported at a later date to another country you must contact the HEUFT subsidiary responsible for that country or HEUFT SYSTEMTECHNIK GMBH at all events.

In Germany, the regulations of the X-ray ordinance and the radiation protection ordinance must be strictly adhered to!

Device designation

The exact device identification can be taken from the identification plate attached to the device.



Packaging and transport

The device will be delivered on a pallet, packed in a cardboard box. Transport the consignment in its original packaging with a fork-lift truck to its place of destination and put it down carefully. HEUFT service personnel will open the carton box for the purpose of mounting and commissioning. In case of self-assembly, the especially trained personnel of the customer will do the same. The entire packaging material is reusable and the customer should arrange for it to be returned to the material flow or collected for recycling.

Temperature range for storage: -20°C to +60°C

Mounting, commissioning and shutdown of the device

Mounting, commissioning and shutdown of the device should be carried out by the HEUFT service or by trained customer's personnel in accordance with the procedures laid down in this Reference Handbook.

General view of *basic* devices

	Standard device *basic*	
	Joint equipment options	
	DELTA-FW rejector	
	DELTA-K rejector	
Laning/Fluid (VF)	*mono* rejector	**Full Container Checks (BA)**
Closure detection Optical empties	*pusher* rejector	Closure detection inductive
Residual liquid detection HF	*flip* rejector	Closure detection optical
Residual liquid detection Gamma	Signal, Warning Light	Closure detection excessive height
Laning unit variable	Trigger, reject verification	Closure detection pressure
Laning unit Jam detector	Additional trigger	Closure detection Foil
Laning unit Signal acceptance at the conveyor	Brands external program change	Closure detection HEUFT *sonic*
Laning unit Signal acceptance in the machine		Fill level detection HF
		Fill level detection Gamma
		Fill level detection X-rays
		Fill level detection Infrared
		Locator detector
		Bottle Burst check
		Bottle Burst forced underfill
		Label detection at the conveyor All Around + Partial + Foil
		Label detection in the labeller Label + Foil
		Serial Fault in the Labeller
		Acceptance of an external signal at the conveyor
		Acceptance of an external signal in the machine

Contents

General description

RB *basic* V8.00

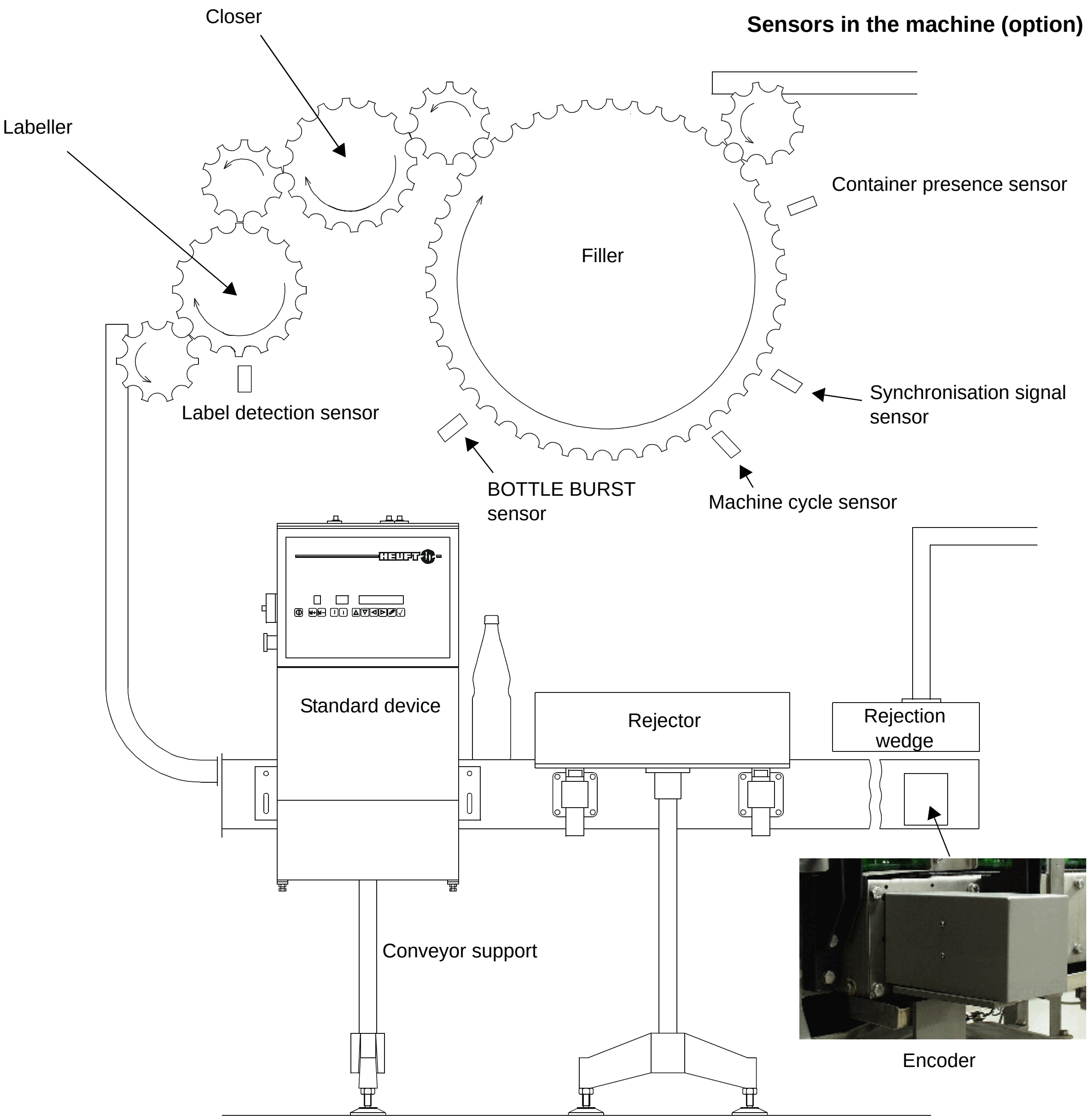
Overview

General

HEUFT *basic* is a modular system for monitoring the product quality in bottling lines.

HEUFT *basic*-devices can be used in various fields of application:

- for the detection of faulty containers by different detection modules in conjunction with the rejection of faulty containers from the stream of production,
- for the automatic monitoring of the machine function in case of fillers, closers and labellers (BA),
- for the location of non-performing valve positions in the filler (BA),
- for the acceptance of signals provided by the customer for the detection and rejection of faulty containers or for the repartition of containers onto two lanes (VF),
- for the repartition of containers in a programmable ratio to two lanes (VF).



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The standard device is mounted directly to the conveyor in the area of the outgoing stream of containers. At this position, it can, for example, check bottles, cans or glass containers with the following dimensions:

Fill level range for full container checks:	30 - 280 mm (for X-rays: 70 - 220 mm)
Maximum container height:	350 mm
Container diameter:	40 - 120 mm

The following components are required to fulfil these tasks:

Standard device

The standard device consists of a stainless steel frame with a maximum of three integrated devices for mechanical adjustments (vertical and horizontal adjustment) and the control unit. Depending on the device equipment, detection modules are mounted to the mechanical adjustment devices.

Conveyor support

For stability reasons, a conveyor support is recommended at the location of the standard device to ensure the detection accuracy. (This part is not included in the scope of delivery!)
Only the additional pedestal for the standard device is included in the scope of delivery.

Encoder

The encoder monitors the container movement on the conveyor and generates a variable cycle for container tracking independent of the conveyor speed. This enables to locate the position of any container that has passed the main trigger.

Per rotation of the conveyor drive shaft the encoder transmits a particular number of pulses to the control unit. Each pulse corresponds to the distance the conveyor has moved. On the basis of any trigger position and by counting the encoder pulses, the processor of the control unit can at any time determine the position of containers that have passed this trigger.
The encoder is attached to the drive shaft of the conveyor passing below the device.

Sensors in the machines (options)

In case of the optional detection modules in machines, sensors are installed in the filler and the labeller. According to their function these sensors are either photocells or proximity sensors. The sensor signals are transmitted to the control unit. Sensors are required for Locator, Bottle Burst, label detection in the labeller and serial fault detection in a machine (filler or labeller). The sensor installation is dependent on local conditions.

Locator	The valve locator allocates underfilled and overfilled containers to the corresponding filler valve.
BOTTLE BURST	Detection of burst bottles within the filler and later rejection of neighbouring bottles and bottles from succeeding filler rounds filled at the same valve in order to avoid the delivery of containers bearing the risk of containing glass fragments.

Rejector

The rejector removes faulty containers from the flow of production.
It is also used to

- reject samples for quality control and to
- distribute containers in a ratio to be programmed as desired (VF).

Five different rejector types are available.

Rejection wedge

The rejection wedge is installed in the container guide rails and prevents that rejected containers slide back in the stream of production containers.

Device qualities

The standard device is well conceived and has a great variety of equipment:

- Great reliability by highest possible integration density of the electronic system (microprocessors and programmable gate arrays)
- Self monitoring of the operating software and signal emission in case of a malfunction
- Exact evaluation of all detected faults by separate counters
- Automatic data saving of counter readings in case of a power failure
- Support of up to 16 different production programs
- Data display and programming via foil keyboard on the front panel of the control unit
- Well visible LED-displays of the selected program and of all counters and operating conditions
- Programmable module for the detection of serial faults
- Due to its compact dimensions the device can be installed even in difficult room conditions
- In case of brand changes measuring bridge adjustment to the millimetre by means of spindles
- Dustproof and hoseproof control unit (IP65)
- Energy-saving stand-by mode
- Safe function even in case of varying conveyor speeds ensured by the encoder
- Interface for external count signals (4 inputs, 4 outputs) and external clearing of counters (1 input, 1 output)
- Random sampling function to reject containers for quality control purposes
- Interface for external program changes
- Acceptance of signals in the machine or conveyor area

Only in case of Laning/Fluid devices:

- Variable repartition to two lanes

Functional principle

Full container checks (BA)

Different sensors installed in measuring bridges or machines permit a continuous monitoring of the production process for the detection of defined faults without immediate contact with the product. The control unit compares the obtained data with the programmed parameters and controls the elimination of containers that are evaluated as faulty from the stream of production by activating the rejector.

Laning/Fluid (VF)

The use of sensors or signals provided by customer devices permits to monitor the production process for the detection of defined faults or to distribute containers to 2 lanes. The control unit compares the obtained data with the programmed parameters and activates the rejector according to the obtained result.

Standard device

Control unit

The control unit is the heart of the system. The control unit collects and evaluates the measuring results obtained by the individual sensors, displays them on the front panel and controls the connected rejector.

Front panel

The front panel with the foil keyboard and the LED-displays serves as the operator interface.
The front panel is equipped with the display elements and control keys of the device.
The displays for menu, path and numbers are red LED-modules which illuminate according to their selection.
All inputs are made via the control keys on the front panel. The displays will change accordingly.

Main power switch

This switch is used to disconnect the device from the mains power supply.
It can be turned to the required position.

On

Off

Shutter switches (optional)

For the fill level detections Gamma and X-ray as well as for the residual liquid detection Gamma two additional switches are installed on both sides of the conveyor side frame. The switches provide a safety measure to close the radiation area before effecting maintenance or adjustments.
The radiation area is not open unless both switches are in position 1.

Switch used in Germany

Switch used outside Germany

0
Radiation area closed

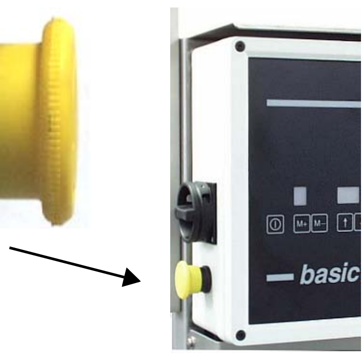
1
Radiation area open

Work/rest switch

This switch disables the rejector. Pressing the switch deactivates the rejector, i.e. no more rejection of containers.
To activate the rejector the knob must be turned in direction of the arrows and extends automatically to its spring-loaded position.

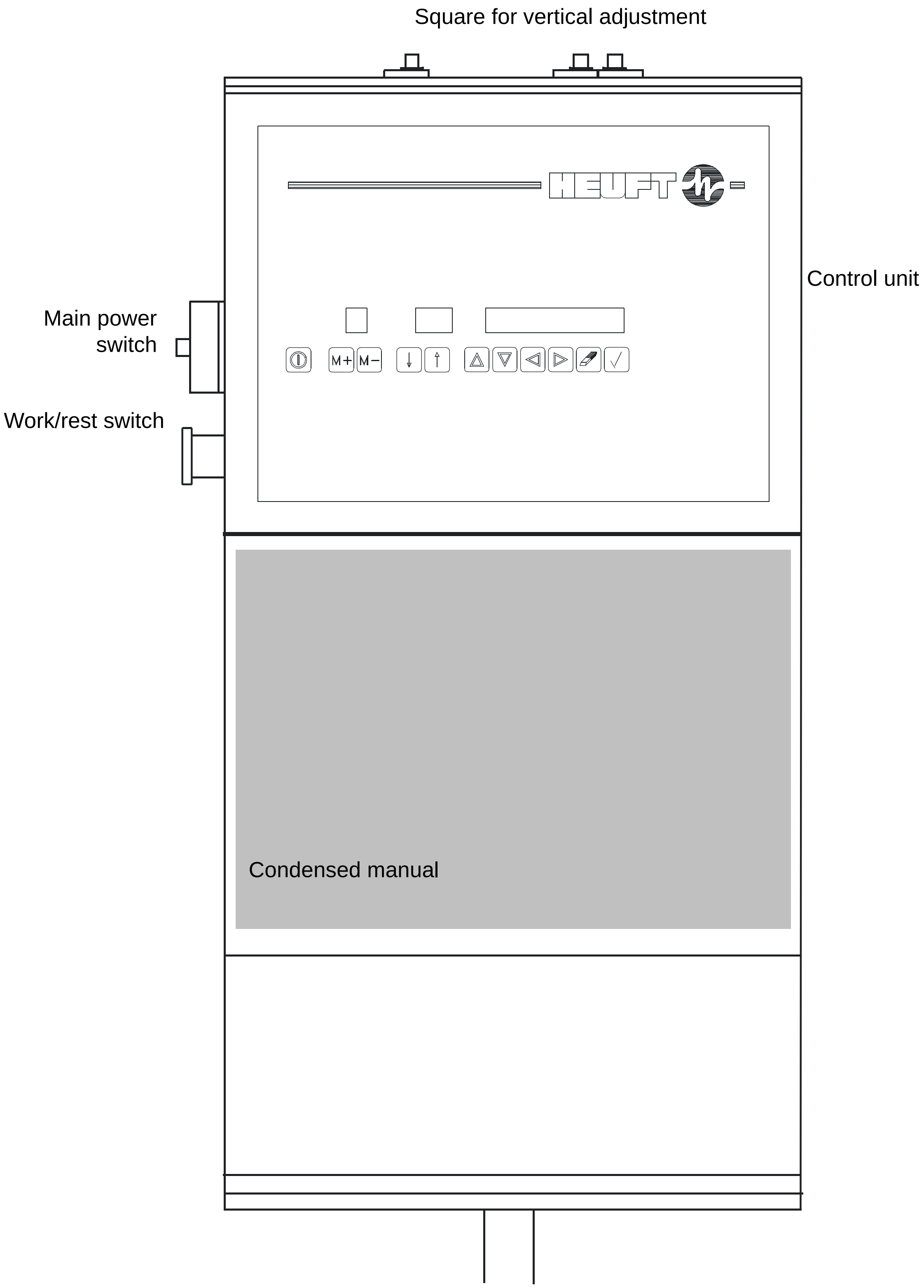
Rejector activated

Rejector deactivated



Condensed Manual

The Condensed Manual attached to the cover of the cable box below the control unit provides the operator with the table of information required for brand changes. During device commissioning, all values relating to the vertical and horizontal adjustment of measuring bridges and the program number for the container types used will be entered in this table.
The Condensed Manual also explains the most important operating functions of the device.



View with operating elements

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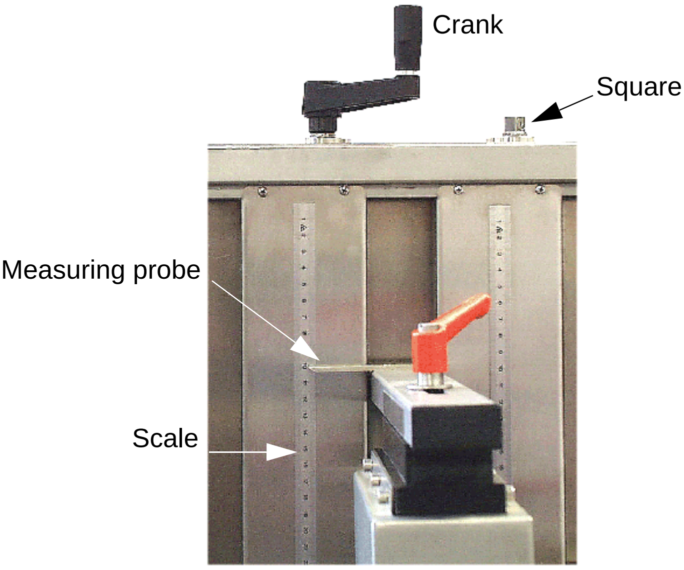
Mechanical adjustment devices

A maximum of three adjustment devices can be installed in the rear of the device which permit the vertical and horizontal adjustment of the measuring bridges. A measuring bridge is attached below the corresponding horizontal adjustment device.

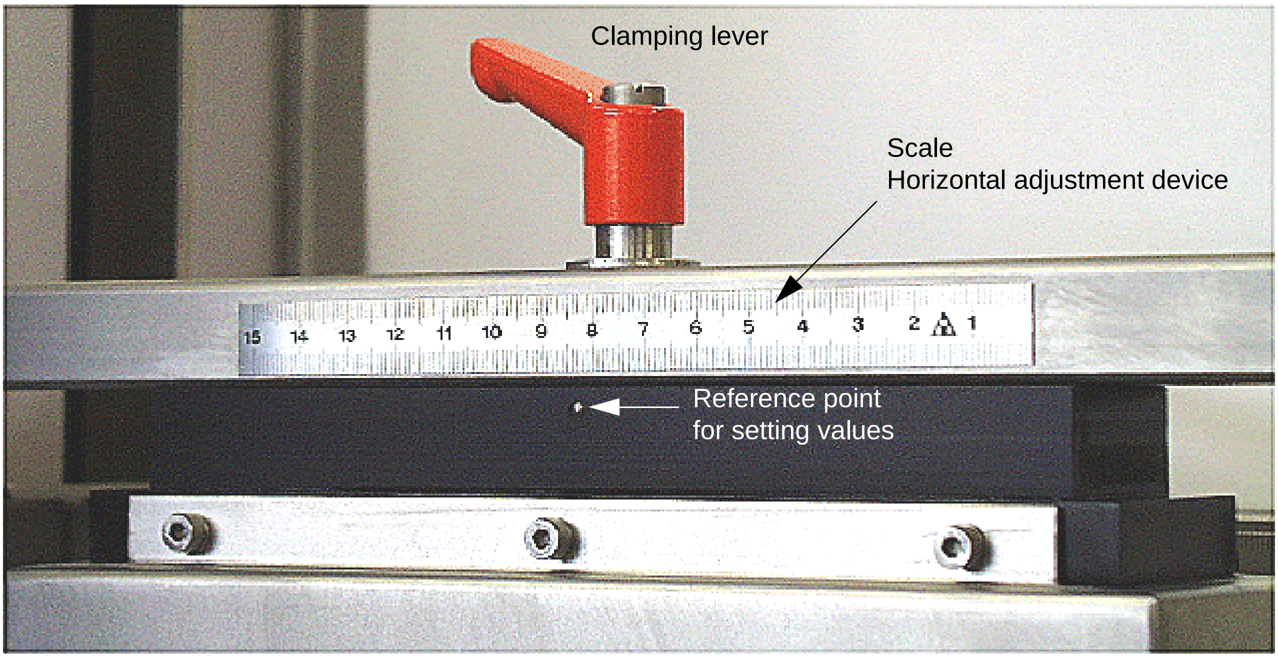
Vertical adjustment device

In case of a brand change a measuring bridge is adapted to the container type in order to assure the correct function of all sensors.
A crank placed to the square of the threaded spindle is used to change the height of a measuring bridge. A measuring probe indicates the current value on the scale.



Horizontal adjustment device

A scale beside the horizontal adjustment device permits the reproducible adjustment of a measuring bridge according to every container program so that all containers pass through the centre of a measuring bridge. A clamping lever locks a measuring bridge in the required position.



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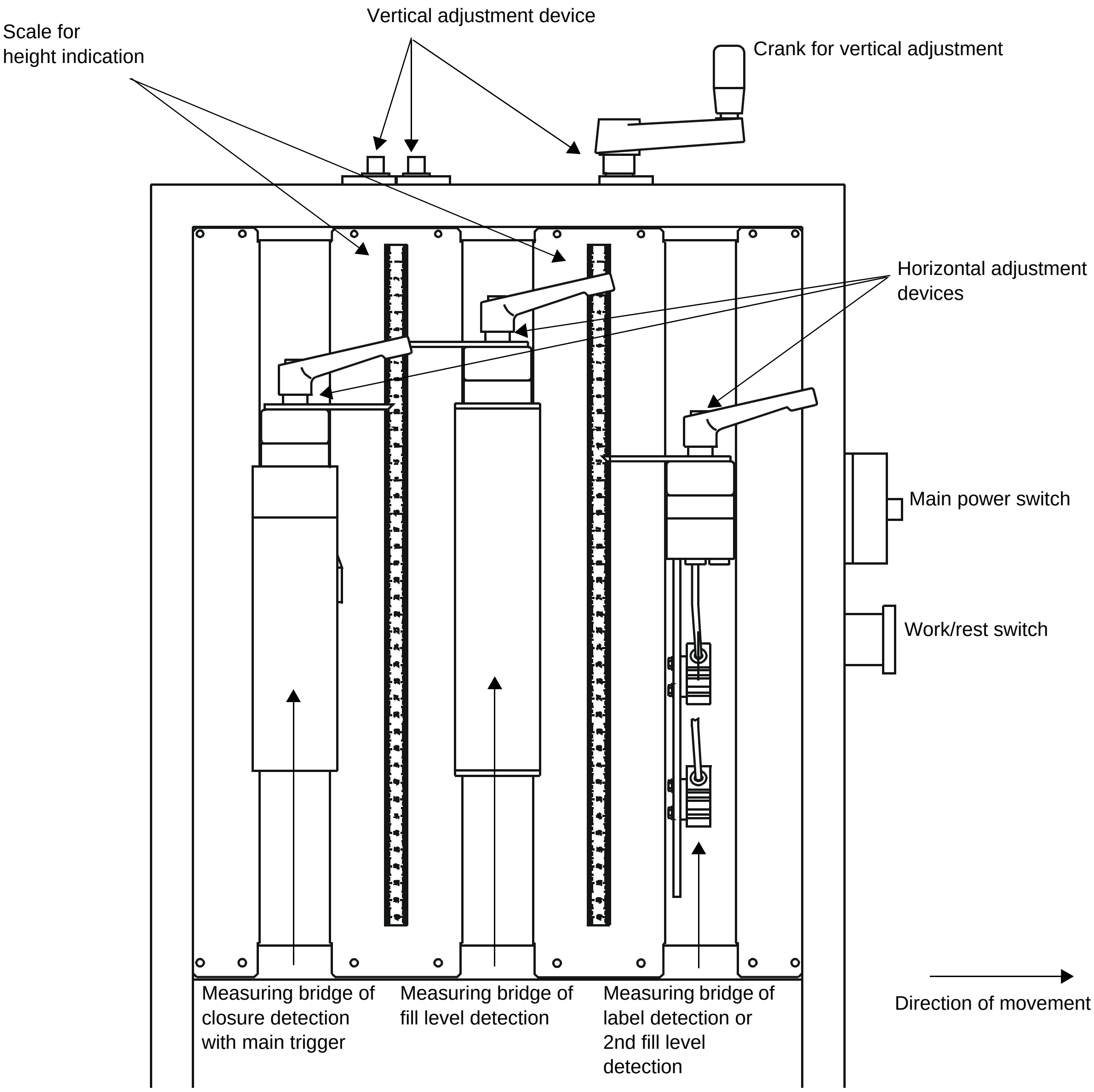
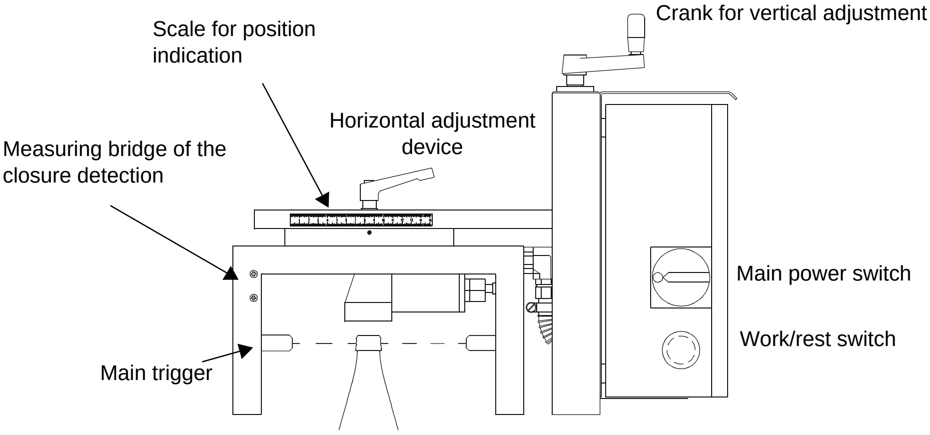
Full container checks



Rear view of the *basic* for full container checks with detection modules and adjustment devices



Side view in moving direction

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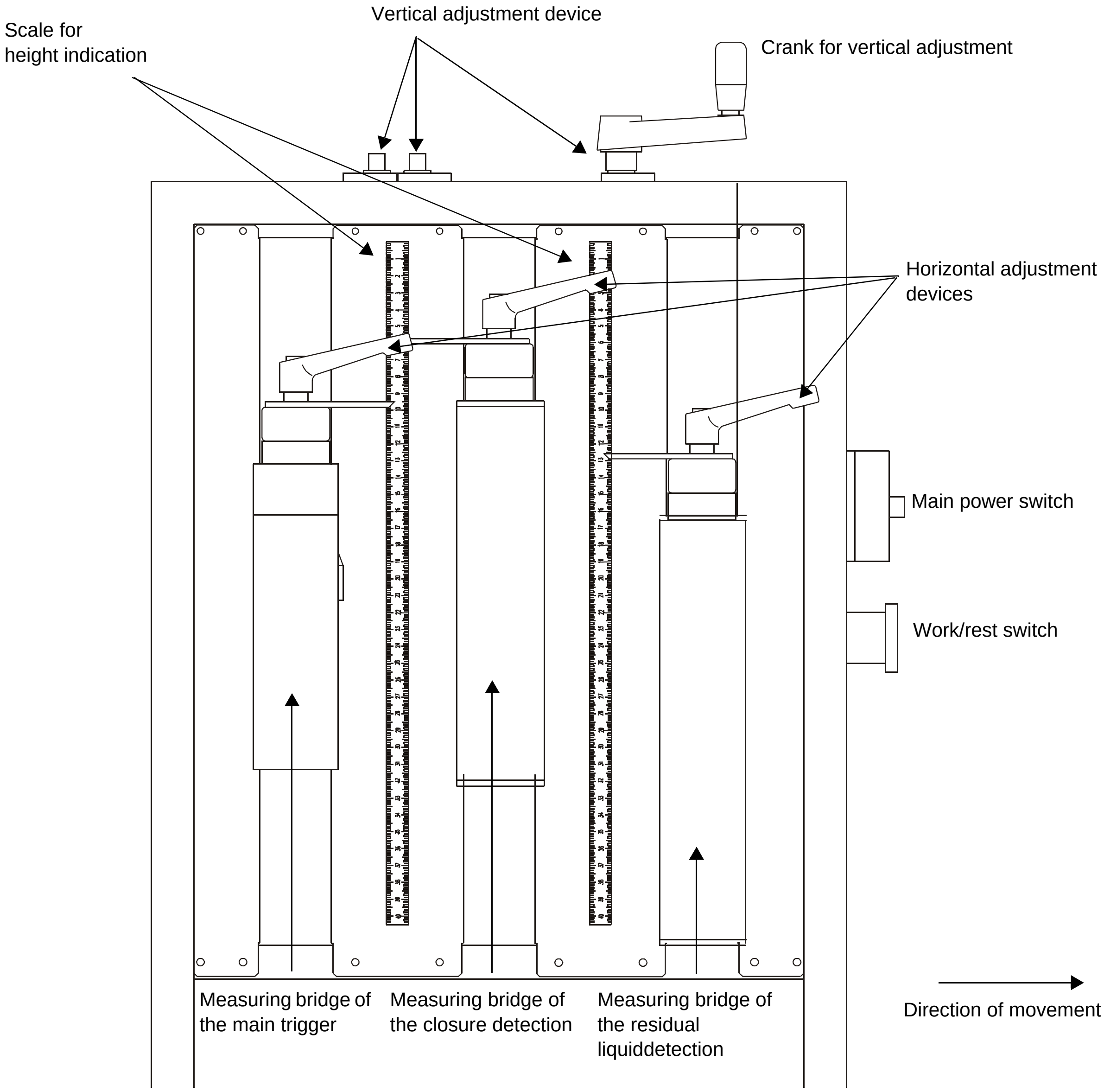
Laning/Fluid



Rear view of a *basic* for laning/fluid with detection modules and adjustment devices

Operating

The exact description of operating procedures for the device is included in the Operator's Manual delivered with the device. The following description is based on the knowledge provided in this manual.

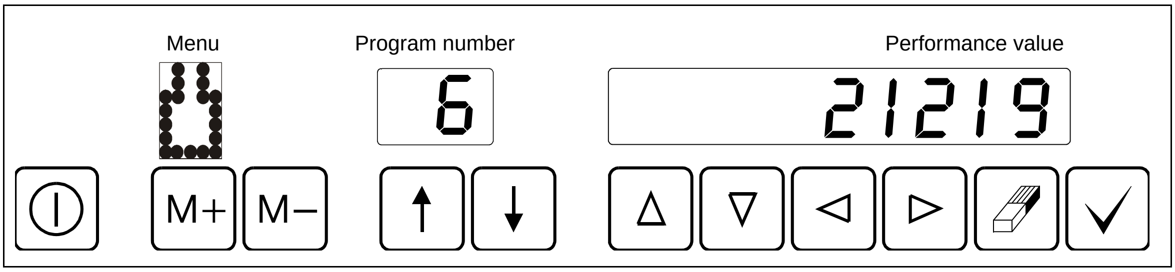
All menus are displayed by a symbol. The corresponding individual display elements can be attained via a path number within the respective menu. The numerical representation in the digital displays is dependent on a selected path (⇒ Selection of menu/path/digital display, "Operating" chapter of the Operator's Manual). The commissioning requires the menu levels detection data and device data in addition to the operator level.

After start-up the device is always at the operator level (level 1).
The required order of key combinations must be carried out within 2 seconds. From level 1 the operator can first select the detection data level (level 2) and then the device data level (level 3).

After switching to the stand-by mode, access is only possible to the operator level.

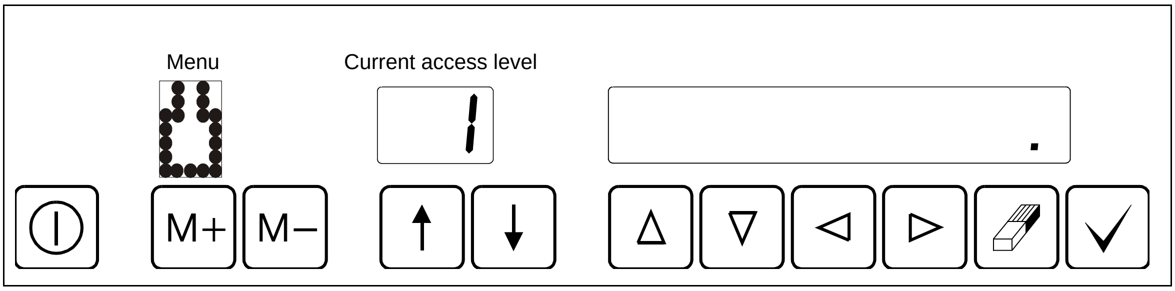
Access to the menu levels

» Change to the menu:



» Activate the change of access;

while the ✓ key is depressed activate the △ key; the display changes to:



» Enter the key combination for the change to the next higher level:

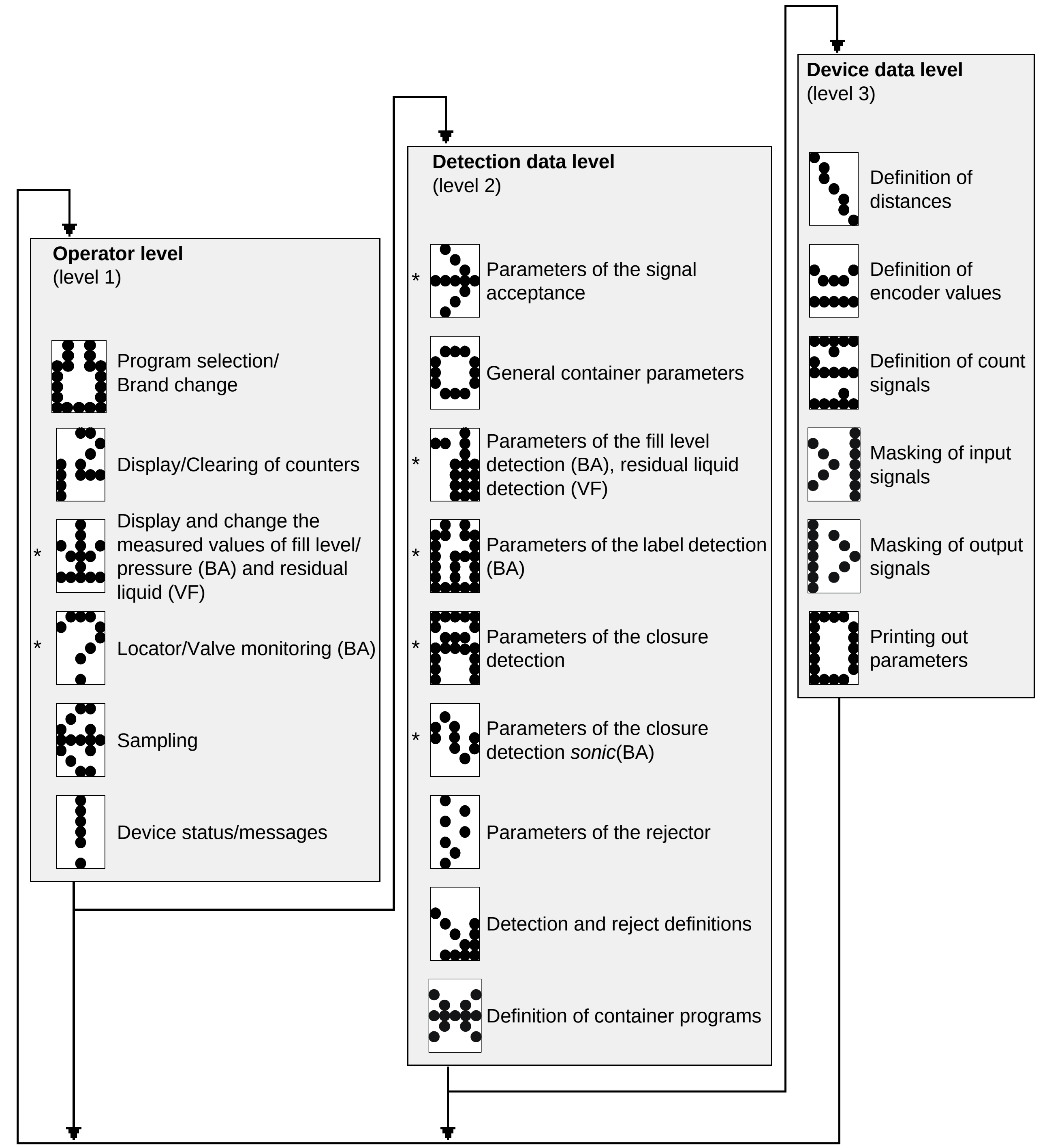
Detection data level (level 2) key combination ↓ ↑

Device data level (level 3) key combination M+ M–

The displayed dot jumps one to the left by one field when pressing the first key and disappears when pressing the second key. In case of a correct entry, the path display indicates the new access level. After 2 seconds, the display returns to the program menu.

Order of keys for the change to the **lowest** level: M– ↓

Survey of available menus at the individual levels



Menu tree

The menu tree provides an overall view of all available menus and paths. All available menus can be attained in a predetermined order in a loop.

In level 2 the program selection/brand change menu is displayed after the definition of container programs menu when pressing the M+ key.

Menus which are not required for a customer-specific device combination cannot be selected. Optional menus in the menu tree are marked with this character *.

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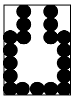
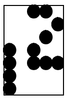
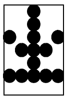
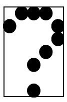
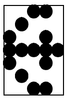
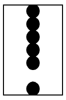
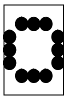
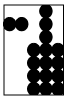
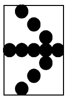
Symbol	Menu	Path	Operator level
	Program selection/Brand change	1-program 1	BA
		...	
		16-program 16	
	Display/Clearing of counters	1-total counter	
		2-good containers	
		3-rejected containers	
		4-underfilled containers	
		5-overfilled containers	
		6-missing label 1	
		7-missing label 2	
		8-missing label 3	
		9-missing label 4	
		10-missing label 5 (foil)	
		11-missing closure	
		12-closure too high/canted closure	
		13-pressure too low/frequency too low	
		14-pressure too high/frequency too high	
		15-broken containers	
		16-containers with a risk of glass fragments	
		17-shutter fault	
		18-sampled containers	
		19-external signal acceptance, machine	
		20-external signal acceptance, conveyor	
		21-external counter 1	
		22-external counter 2	
		23-external counter 3	
		24-external counter 4	
	Measured values fill level/pressure	1-underfill	
		2-overfill	
		3-pressure too low	
		4-pressure too high	
		5-canted closure	
		6-analog measured value	
		7-frequency too low	
		8-frequency too high	
		9-energy too low	
		10-energy too high	
		11-*sonic* signal amplitude	
	Locator/Valve monitoring	1-most recent non-performing valve	
		2...9-previous entries	
		10-valve with most underfills	
		11...19-valve with second to tenth most underfills	
		20-valve with most overfills	
		21...29-valve with second to tenth most overfills	

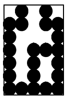
Depending on the device equipment, not all of the listed menus and/or paths are available.

Symbol	Menu	Path	Operator level
	Sampling	1-number of sampled containers	BA
	Device status/messages	1-overall status	
		2-standard device	
		3-signals	
		4-device monitoring	
		5-detection modules	
		6-counter of operating hours	
		7-disturbances in the mains voltage supply	
	General container parameters	1-neck diameter	
		2-body diameter	
	Parameters of the fill level detection	1-length of measuring window Gamma UF / X-ray UF / HF	
		2-limit value for Gamma UF / X-ray UF / HF UF	
		3-last measured value of Gamma UF / X-ray UF / HF	
		4-length of measuring window Gamma OF / X-ray OF / HF OF	
		5-limit value for Gamma OF / X-ray OF / HF OF	
		6-last measured value of Gamma OF / X-ray OF	
		7-minimum frequency bridge Gamma UF / X-ray UF / HF	
		8-maximum frequency bridge Gamma UF / X-ray UF / HF	
		9-current frequency bridge Gamma UF / X-ray UF / HF	
		10-minimum frequency bridge Gamma OF	
		11-maximum frequency bridge Gamma OF / X-ray OF	
		12-current frequency bridge Gamma OF / X-ray OF	
		13-gap value reference rate bridge Gamma UF / X-ray UF/HF	
		14-gap value reference rate bridge Gamma OF / X-ray OF	
		15-automatic shutter control (0=off; 1=on)	
		16-gap for automatic shutter control	
		17-gap value X-ray UF	
		18-gap value X-ray OF	
		19-monitoring of gap value X-ray (0=30 min., 1=4 h, 2 = no message)	
		20-automatic measurement of the gap value	
		21-length of measuring window, infrared underfill	
		22-pulse evaluation (0=bad, 1=good)	
		23-lower limit for number of pulses	
		24-upper limit for number of pulses	
		25-last measured value	
		26-length of measuring window, infrared overfill	
		27-pulse evaluation (0=bad, 1=good)	
		28-lower limit for number of pulses	
		29-upper limit for number of pulses	
		30-last measured value	

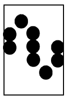
Depending on the device equipment, not all of the listed menus and/or paths are available.

UF = Underfill, OF = Overfill

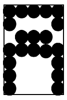
Symbol	Menu	Path	Operator level
	Parameters of the signal acceptance	1-pulse evaluation (0=bad, 1=good)	BA
		2-pulse type (0=pulse, 1=constant level)	
		3-lower limit for signal length [ms]	
		4-counter "signal too early"/last measured value, delay [ms]	
		5-max/min values for delay [ms]	
		6-counter "signal too early"/last measured value, signal length [ms]	
		7-max/min values for signal length [ms]	

Symbol	Menu	Path	Program data level
	Parameters of the label detection	1-length of measuring window, label 1	BA
		2-pulse evaluation (0=bad; 1=good)	
		3-lower limit for number of pulses	
		4-upper limit for number of pulses	
		5-last measured value	
		6-length of measuring window, label 2	
		7-pulse evaluation (0=bad; 1=good)	
		8-lower limit for number of pulses	
		9-upper limit for number of pulses	
		10-last measured value	
		11-length of measuring window, label 3	
		12-pulse evaluation (0=bad; 1=good)	
		13-lower limit for number of pulses	
		14-upper limit for number of pulses	
		15-last measured value	
		17-pulse evaluation (0=bad; 1=good) label 4	
		21-length of measuring window, label 5 (foil)	
		22-pulse evaluation (0=bad; 1=good)	
		23-lower limit for number of pulses	
		24-upper limit for number of pulses	
		25-last measured value	

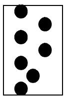
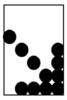
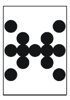
Depending on the device equipment, not all of the listed menus and/or paths are available.

Symbol	Menu	Path	Program data level
	Parameters of the closure detection *sonic*	1-delay distance [mm]	BA
		2-microphone gain	
		3-start of frequency measurement	
		4-end of frequency measurement	
		5-start of energy measurement	
		6-length of energy measurement	
		7-threshold value for 1st zero crossing	
		8-trigger source (0=normal; 1=internal)	
		10/L-measured value, relative frequency	
		10/R-limit value for "frequency too low"	
		11-limit value for "frequency too high"	
		12/L-measured value, amplitude	
		12/R-threshold for amplitude	
		13/L-measured value, energy	
		13/R-limit value for "energy too low"	
		14-limit value for "energy too high"	
		15/L-measured value, frequency	
		15/R-dynamic tracking of the frequency?	
		16-start new formation of mean values?	
		17/L-mean frequency value	
		17/R-dynamic reference frequency	
		18/L-maximum value of mean frequency	
		18/R-minimum value of mean frequency	

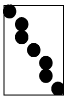
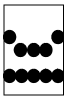
Indication in the digital display: L= left, R=right

	Parameters of the closure detection	1-length of measuring window, closure presence
		2-pulse evaluation (0=bad; 1=good)
		3-lower limit for number of pulses
		4-upper limit for number of pulses
		5-last measured value
		6-length of measuring window, excessive height
		7-pulse evaluation (0=bad; 1=good)
		8-lower limit for pulse evaluation
		9-upper limit for pulse evaluation
		10-last measured value
		11-lower limit of the pressure sensor measuring range
		12-upper limit of the pressure sensor measuring range
		13-length of measuring window, pressure measurement
		14-limit value for "pressure too low"
		15-limit value for "pressure too high"
		16-evaluation mode (0=min; 1=max)
		17-limit value for canted closure
		18-measured values pressure/canted closure

Depending on the device equipment, not all of the listed menus and/or paths are available.

Symbol	Menu	Path	Program data level
	Parameters of the rejector	1-maximum number of segments	BA
		2-minimum number of segments	
		3-minimum switching speed	
		4-max. switching speed	
		5-counter reading of bottom photocell	
		6-bottom photocell (0=off; 1=on)	
		7-drive time *mono*/*pusher*	
		8-drive time *mono*/*pusher*	
		9-display of the reject situation	
		10-selection *DELTA-FW/DELTA-K* (0=deactivated/ 1=FW 10 seg./ 2=FW 10 seg.M/ 3=FW 16 seg./ 4=FW 16 seg.M/ 5=K/ 6=K-M / 7=FW 10 seg.SM/ 8=FW 16 seg.SM/ 9=K SM/ 10=FW Fast M/ 11=FW Fast SM)	
		14-pilot control time: valve downwards	
		15-pilot control time: valve upwards	
		16-shifting of the activation	
		17-display of the flip status: 0=piston down, 1=piston up	
	Detection and reject definitions	1-container presence	
		2-forced underfill Bottle Burst	
		3-shower Bottle Burst	
		4-fill level detection, underfill	
		5-fill level detection, overfill (0=off; 1=on; 2=counting only)	
		6-label detection 1	
		7-label detection 2	
		8-label detection 3	
		9-label detection 4	
		10-label detection 5 (foil)	
		11-closure detection, presence	
		12-closure detection, excessive height/canted closure	
		13-closure detection *sonic*, frequency too low	
		14-closure detection *sonic*, frequency too high/pressure	
		15-Bottle Burst detection	
		19-signal acceptance	
	Definition of container programs	1-copy into the current program	
		2-mask of used programs 1-8 (0=vacant, 1=used)	
		3-mask of used programs 9-16 (0=vacant, 1=used)	
		4-brands, external program change (0=manual, 1=external)	

Depending on the device equipment, not all of the listed menus and/or paths are available.

Symbol	Menu	Path	Device data level
	Definition of distances	1-machine begin - end	BA
		2-machine, container presence - end	
		3-machine, synchronisation signal - end	
		4-number of filler valves	
		5-machine, container presence - Bottle Burst	
		7-machine, container presence - underfill	
		8-machine, container presence - shower	
		9-machine, label 1 - end	
		10-machine, label 2 - end	
		11-machine, label 3 - end	
		12-machine, label 4 - end	
		13-machine, label 5 (foil) - end	
		14-machine, external signal - end	
		21-machine end - main trigger conveyor	
		22-conv. main trigger - bridge closure det. inductive/optical/ pressure/*sonic*	
		23-conveyor main trigger - bridge fill level detection 1 (UF) / HF	
		24-conveyor main trigger - bridge fill level detection 2 (OF) / label detection	
		25-conveyor, main trigger - external signal	
		26-conveyor, main trigger - bottom photocell	
		27-conveyor, main trigger - rejector	
		28-conveyor, main trigger - trigger 2	
		29-conveyor, main trigger - trigger 3	
		30-conveyor, main trigger - counters	
		31-conveyor, main trigger - end	
	Definition of encoder values	1-current speed	
		2-encoder source (0=encoder, 1=internal)	
		3-nominal internal speed value	
		4-measuring distance for predivisor measurement	
		5-result of the predivisor measurement	
		6-predivisor	

Depending on the device equipment, not all of the listed menus and/or paths are available.

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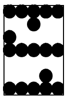
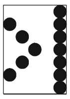
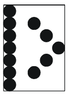
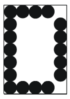
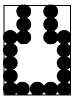
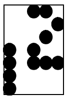
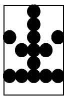
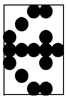
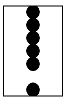
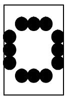
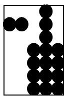
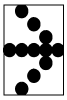
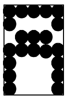
Symbol	Menu	Path	Device data level
	Definition of count signals	1-serial fault, standard	BA
		2-serial fault, labeller	
		3-Locator, filler valve detector	
		4-switch-off pulse, conveyor (0=deactivated/1=activated)	
		5-switch-off pulse, machine (0=deactivated/1=activated)	
		6-pulse type of count signals (0=edge triggering/ 1=pulsetriggering)	
		7-pulse length	
		8-reduction factor	
		9-counter output 1 (0=deactivated)	
		10-counter output 2 (0=deactivated)	
		11-counter output 3 (0=deactivated)	
		12-counter output 4 (0=deactivated)	
		13-input, clear counters (0=deactivated/1=activated)	
		14-input, clear counters (0=deactivated/1=activated)	
		15-choice list, Bottle Burst check (0=3/1/1; 1=5/3/1)	

Depending on the device equipment, not all of the listed menus and/or paths are available.

The menus ,  and  are on page 46.

Symbol	Menu	Path	Operator level
	Program selection/Brand change	1-program 1	VF
		...	
		16-program 16	
	Display/Clearing of counters	1-total counter	
		2-good containers/distribution to lane 1	
		3-rejected containers/distribution to lane 2	
		5-containers with residual liquid	
		11-closure present	
		17-shutter fault	
		18-sampled containers	
		19-external signal in the machine	
		20-external signal at the conveyor	
		21-external counter 1	
		22-external counter 2	
		23-external counter 3	
		24-external counter 4	
	Measured values, residual liquid	2-residual liquid	
		6-analog measured value	
	Sampling	1-number of sampled containers	
	Device status/messages	1-overall status	
		2-standard device	
		3-signals	
		4-device monitoring	
		5-detection modules	
		6-counter of operating hours	

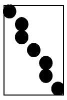
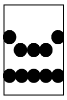
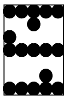
Depending on the device equipment, not all of the listed menus and/or paths are available.

Symbol	Menu	Path	Program data level
	General container parameters	1-neck diameter	VF
		2-body diameter	
	Parameters of the residual liquid detection	4-length of measuring window, residual liquid	
		5-limit value for residual liquid	
		6-last measured value of residual liquid	
		10-minimum frequency for bridge residual liquid	
		11-maximum frequency	
		12-current frequency for bridge residual liquid	
		14-gap value reference rate for bridge residual liquid Gamma	
		15-automatic shutter control (0=off/1=on)	
		16-gap for automatic shutter control [mm]	
	Parameters of the signal acceptance	1-pulse evaluation (0=bad, 1=good)	
		2-pulse type (0=pulse, 1=constant level)	
		3-lower limit for signal length [ms]	
		4-counter "signal too early"/last measured value, delay [ms]	
		5-max/min values for delay [ms]	
		6-counter "signal too early"/last measured value, signal length [ms]	
		7-max/min values for signal length	
	Parameters of the closure detection	1-length of measuring window, closure presence	
		2-pulse evaluation (0=bad; 1=good)	
		3-lower limit for number of pulses	
		4-upper limit for number of pulses	
		5-last measured value	

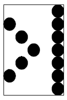
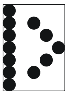
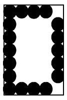
Depending on the device equipment, not all of the listed menus and/or paths are available.

Symbol	Menu	Path	Program data level
	Parameters of the rejector	1-maximum number of segments	VF
		2-minimum number of segments	
		3-minimum switching speed	
		4-max. switching speed	
		5-counter reading of bottom photocell	
		6-bottom photocell (0=off / 1=on)	
		7-drive time *mono*/*pusher*	
		8-drive time *mono*/*pusher*	
		9-rejector display	
		10-selection *DELTA-FW*/*DELTA-K* (0=deactivated/ 1=FW 10 seg./ 2=FW 10 seg.M/ 3=FW 16 seg./ 4=FW 16 seg.M/ 5=K/ 6=K-M / 7=FW 10 seg.SM/ 8=FW 16 seg.SM/ 9=K SM/ 10=FW Fast M/ 11=FW Fast SM)	
		11-laning ratio, lane 1	
		12-laning ratio, lane 2	
		13-faulty container on lane 1	
		14-pilot control time: valve downwards	
		15-pilot control time: valve upwards	
		16-shifting of the activation	
		17-display of the *flip* status: 0=piston down, 1=piston up	
	Detection and reject definitions	5-residual liquid detection	
		11-closure detection	
		19-external signal	
		21-laning	
	Definition of container programs	1-copy into the current program	
		2-mask of used programs 1-8 (0=vacant, 1=used)	
		3-mask of used programs 9-16 (0=vacant, 1=used)	
		4-brands, external program change (0=manual, 1=external)	

Depending on the device equipment, not all of the listed menus and/or paths are available.

Symbol	Menu	Path	Device data level
	Definition of distances	1-machine begin - end	VF
		14-machine, external signal - end	
		21-machine end - main trigger conveyor	
		22-conveyor, main trigger - bridge closure detection	
		24-conveyor, main trigger - bridge, residual liquid detection	
		25-conveyor, main trigger - external signal	
		26-conveyor, main trigger - bottom photocell/laning	
		27-conveyor, main trigger - rejector	
		28-conveyor, main trigger - trigger 2	
		29-conveyor, main trigger - trigger 3	
		30-conveyor, main trigger - counters	
		31-conveyor, main trigger - end	
	Definition of encoder values	1-current speed	
		2-encoder source (0=encoder, 1=internal)	
		3-nominal internal speed value	
		4-measuring distance for predivisor measurement	
		5-result of the predivisor measurement	
		6-predivisor	
	Definition of count signals	1-serial fault, standard	
		4-switch-off pulse, conveyor (0=deactivated/1=activated)	
		6-pulse type of count signals (0=edge triggering/ 1=pulse triggering)	
		7-pulse length	
		8-reduction factor	
		9-counter output 1 (0=deactivated)	
		10-counter output 2 (0=deactivated)	
		11-counter output 3 (0=deactivated)	
		12-counter output 4 (0=deactivated)	
		13-input, clear counters (0=deactivated/1=activated)	
		14-output, clear counters (0=deactivated/1=activated)	
		19-inhibit distance, jam detector	

Depending on the device equipment, not all of the listed menus and/or paths are available.

Symbol	Menu	Path	Device data level
	Masking of input signals	1-inputs 1-8	BA and VF
		2-inputs 9-16	
		3-inputs 17-24	
		4-inputs 25-32	
	Masking of output signals	1-outputs 1-8	
		2-outputs 9-16	
		3-outputs 17-24	
		4-outputs 25-32	
	Printing out parameters	1-printer status (0=printer OK, 1=printer off-line, 3=no paper)	
		2-device parameters (0=no print-out, 1=print-out)	
		3-detection parameters of programs 1-8 (0=no print-out, 1=print-out)	
		4-detection parameters of programs 9-16 (0=no print-out, 1=print-out)	

Display of input and output signals

When selecting the single input and output signals the digital display indicates the configuration of bits required for the installation and commissioning. The bit occupation must be read from right (bit 0) to left (bit 7). The figures 0 and 1 indicate whether the system inverts the signals.

0= signal remains unaltered

1= signal is turned (LOW ↔ HIGH)

Occupation of input signals

Path

1 inputs 1-8

	BA Default value	BA Occupation	VF Default value	VF Occupation
bit 0	0	foil	1	bottom photocell
bit 1	1	bottom photocell	0	closure
bit 2	0	closure optical/inductive	0	jam signal lane 1
bit 3	0	label 1	0	jam signal lane 2
bit 4	0	label 2		
bit 5	0	label 3		
bit 6	0	label 4		
bit 7	0	excessive height		

2 inputs 9-16

	BA Default value	BA Occupation	VF Default value	VF Occupation
bit 0	0	zero synchronisation filler		
bit 1	0	fill level detection infrared underfill		
bit 2	0	work/rest	0	work/rest
bit 3	0	external signal conveyor	0	external signal, conveyor
bit 4	0	container presence		
bit 5	0	Bottle Burst		
bit 6	0			
bit 7	0	machine cycle	0	machine cycle

3 inputs 17-24

bit 0	1	main trigger	1	main trigger
bit 1	1	trigger 2	1	trigger 2
bit 2	1	trigger 3	1	trigger 3
bit 3	0	count signal 1	0	count signal 1
bit 4	0	count signal 2	0	count signal 2
bit 5	0	count signal 3	0	count signal 3
bit 6	0	count signal 4	0	count signal 4
bit 7	1	shutter, fill level overfill	1	shutter, residual liquid Gamma

Path		**BA**		**VF**
4 inputs 25-32	Default value	Occupation	Default value	Occupation
bit 0	1	shutter fill level underfill	0	
bit 1	0	program number, coded = LSB	0	program number, coded = LSB
bit 2	0	program number, coded	0	program number, coded
bit 3	0	program number, coded	0	program number, coded
bit 4	0	program number, coded = MSB	0	program number, coded = MSB
bit 5	0	fill level detection infrared overfill		
bit 6	0	external signal machine	0	external signal machine
bit 7	0	clear counters	0	clear counters

LSB = less significant byte MSB = most significant byte

Occupation of output signals

Path

1 outputs 1-8 **(BA and VF)**

	Default value	Occupation
bit 0	0	rejector segment 1 or *flip* - valve 1
bit 1	0	rejector segment 2 or *flip* - valve 2
bit 2	0	rejector segment 3
bit 3	0	rejector segment 4
bit 4	0	rejector segment 5
bit 5	0	rejector segment 6
bit 6	0	rejector segment 7
bit 7	0	rejector segment 8

2 outputs 9-16 **(BA and VF)**

bit 0	0	rejector segment 9
bit 1	0	rejector segment 10
bit 2	0	rejector segment 11
bit 3	0	rejector segment 12
bit 4	0	rejector segment 13
bit 5	0	rejector segment 14
bit 6	0	rejector segment 15
bit 7	0	rejector segment 16

3 outputs 17-24		**BA**		**VF**
bit 0	1	shower control	1	start measurement signal accept.
bit 1	1	switch-off pulse 1 (conveyor)	1	switch-off pulse 1 (conveyor)
bit 2	1	switch-off pulse 2 (machine)		
bit 3	1	control forced underfill		
bit 4				
bit 5	1	*mono / pusher*	1	*mono / pusher*
bit 6	0	shutter control	0	shutter control
bit 7	1	clear counters	1	clear counters

4 outputs 25-32 **(BA and VF)**

bit 0	0	count signal 1
bit 1	0	count signal 2
bit 2	0	count signal 3
bit 3	0	count signal 4
bit 4	0	24V circuit
bit 5	0	warning light red
bit 6	0	warning light yellow
bit 7	0	warning light green

Print-out of parameters

In the Appendix of the Operator's Manual the device and detection parameters can be entered manually after commissioning. At the same time, the entered parameters may be printed out on paper via the parallel interface of a printer. The printer and the printer cable are not included in the scope of delivery of the device.

Danger of electric shock!
Only electricians are authorised to open the control unit.
Live voltage of 230 V (115 V) at several locations within the device. These locations are shockproof (IP 20).
Electricians only are authorised to connect the printer cable and print out the parameters!

STOP

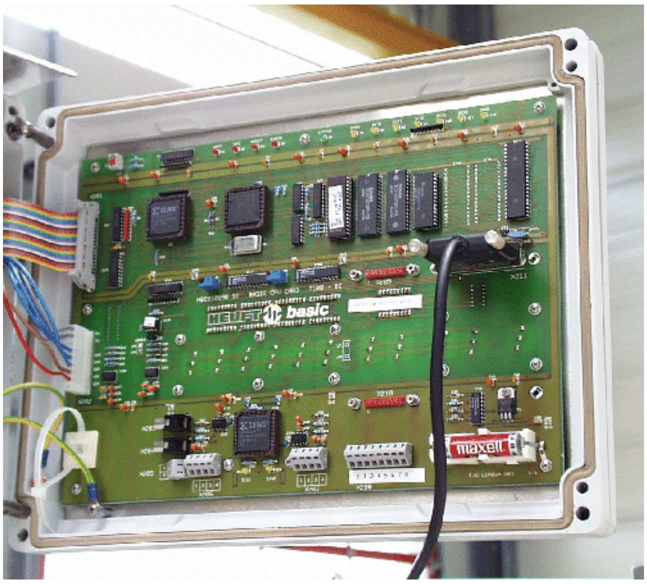
As long as the device is open it must be assured that no moisture will penetrate into the device.

Hold the device cover open with one hand during device operation to avoid damage to the printer plug and printer cable. Printer plug and printer cable might cause damage to the termination cards or lead to a short circuit.

Connecting the printer

1. Open the cover of the casing.

2. Connect the printer to the X211 socket of the *basic* CPU card by means of a standard printer cable.



Printing out parameters

Hold the cover open at the frame with one hand during device operation to prevent the printer plug and printer cable from getting into contact with the termination cards.
Avoid touching the termination cards by hand!

1. Change to the device data level (⇒ Access to the menu levels, page 33).

2. Select the **print-out of parameters** menu.

3. Select path 1.
The first three digits of the display indicate the number of pages already printed out.
The last digit indicates the printer status:
    0 = printer OK
    1 = printer off-line
    3 = no paper

If the printer is not connected "0" is displayed which, however, is of no relevance.

Printing out device parameters

4. Change to path 2 and enter "1" for "print-out".

The entry "0" means: no print-out.

Printing out detection parameters of programs 1 to 8

5. Change to path 3 and enter "1" for "print-out". The entry "0" means: no print-out. Bit7 (**left**) refers to program 8, bit0 (**right**) refers to program 1.

Enter 00000111: print-out of the parameters of programs 1 to 3

Printing out detection parameters of programs 9 to 16

6. Change to path 4 and enter "1" for "print-out". The entry "0" means: no print-out. Bit7 (**left**) refers to program 16, bit0 (**right**) refers to program 9.

Enter 00001001: Print-out of the parameters of program 9 and 12

7. Change to path 1 and start the printing process with the button.

The print job can be cancelled with the button.

RB *basic* V8.00

Detection modules

RB *basic* V8.00

General

The detection modules are attached either above the conveyor on the rear side of the standard device at the horizontal adjustment device, at the conveyor or within the machines (filler or labeller). These various detection modules are used to check all production containers and to transmit corresponding signals to the control unit. The latter analyses the signals and evaluates every container individually.

Trigger

General

The correct function of a detection module is based on the position information of a container on the conveyor. The position information is obtained by using triggers (photocells).

When moving within the distance between the first trigger and the rejector or the reject verification trigger, the containers must not position slip on the conveyor or change their speed relative to the conveyor by any other means.

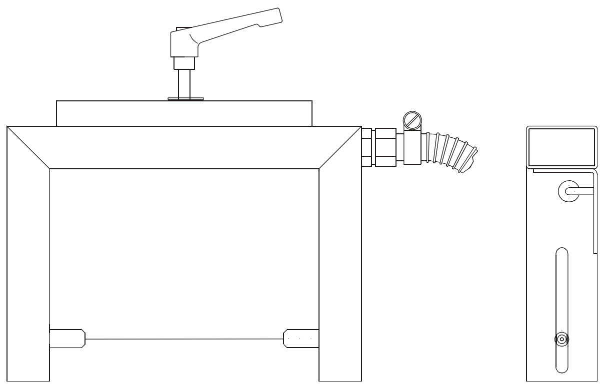
Main trigger

The main trigger is the most important photocell for the identification of containers and initiates all further actions required for the processing of containers until arriving at the rejector.
The main trigger is used for the initial identification of containers on the conveyor. The signal generated by this trigger is used for the exact determination of container positions prior to passing the detection modules of the device. The main trigger is normally installed in the first measuring bridge seen in moving direction.

Function

During the internal processing, the control unit tracks the container position in the entire check area by counting the conveyor cycle pulses (⇒ Encoder).
The system creates an internal electronic data sheet for every detected container when it receives the signal from the main trigger. Every detection device enters the check result "good" or "faulty" for the respective container in the data sheet. The data sheet is evaluated at the end of the check area and the container is either counted as good container or counted as faulty container and rejected. An electronic data sheet is erased after the completion of this process.
In the case of devices with a closure detection (optional), the main trigger is attached

- to the first measuring bridge in case of full container checks with a closure detection,
- to the first measuring bridge in case of a laning/fluid device.



Additional triggers (optional)

Additional triggers are used to check and, if necessary, correct the container position information in case of larger conveyor distances.

The additional triggers are installed at the conveyor.

Function

If one or several machine detection modules are installed in the filler or the labeller, containers must not shift forward or backward by more than one half of their diameter due to curves or conveyor transitions. In order to correct for possible shifting within these limits, a trigger determines the position of a passing container between a machine and the device. The system compares this position information with the internal system data and adapts them to the actual container position if necessary.

If the distance between the device and a rejector is more than 2000 mm, it is also necessary to install a trigger. The distance between the additional trigger and the succeeding rejector must be at least 200 mm. The containers must not position slip in the section between the rejector and the reject verification trigger.

Trigger measuring bridge as additional trigger or reject verification

Reject verification (optional)

The reject verification checks the correct device function. The measuring bridge for the reject verification trigger is attached to the conveyor for good containers immediately after the rejector. Attachment is made by means of a clamping lever.

Function

The rejection of a container creates a gap in the flow of good containers so that the reject verification trigger does not generate a signal for this particular container. When there is a trigger signal, there must be a missed rejection. In order to avoid in any case a faulty container among the good containers, the system generates a stop impulse in such a case.

The containers must not position slip in the section between the rejector and the reject verification trigger.

Closure detection (BA)

General

The sensors for the closure detection are installed in the first measuring bridge seen in moving direction. They check the presence and the deformation of closures.

Inductive (optional)

The inductive closure detection checks the presence of metal closures on containers.

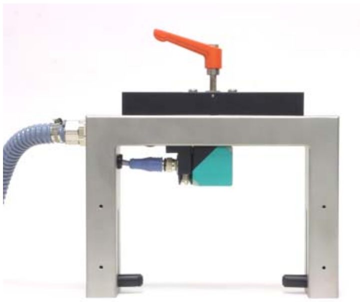
Function

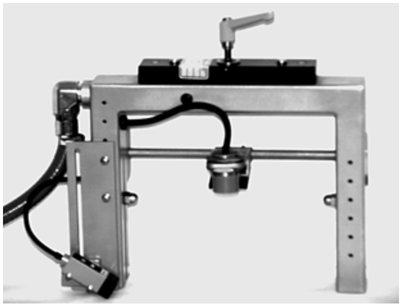
The system evaluates the signal generated by an inductive proximity switch according to its status either as "good" or as "missing closure".

The check conditions are different for closures of bottles or cans. Due to this fact, two function modules of different mechanical design are available:

For bottle checks, the sensor is installed in the middle of the measuring bridge above the trigger lenses.

The other variant is especially designed for closure detection in fast moving can filling installations. The sensor is mounted to a movable shaft on the measuring bridge so that the can passes the closure sensor after it has passed the measuring bridge.





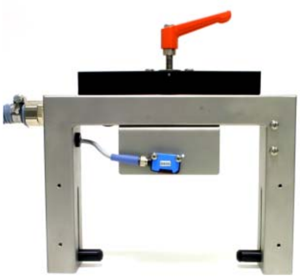
Optical (optional)

The optical closure detection checks the presence of closures on containers.

Function

The system evaluates the signal generated by a light scanner according to its status either as "good" or as "missing closure".

The sensor is installed in the middle of the measuring bridge above the trigger lenses.



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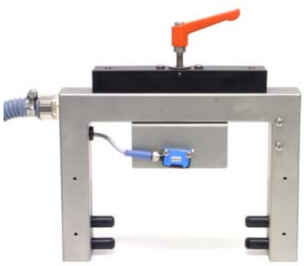
Excessive height (optional)

The closure detection "excessive height" checks whether closures are canted or not correctly screwed close. It is also able to detect battered cans if the can height has increased due to this damage.

Function

Containers with closures of excessive height and containers of excessive height interrupt a photocell which is installed in the measuring bridge with the main trigger above the trigger lenses.

The device evaluates the signal generated by the photocell corresponding to the signal condition either as "container too tall" or as "good container".



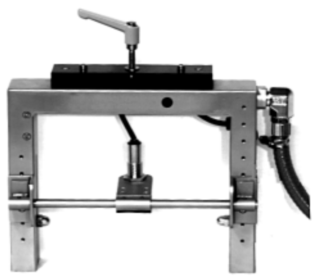
Pressure (optional)

This closure detection module is designed for checking the concave or convex deformation of closures, which permits conclusions regarding the pressure within a container. This function module can be used to check vacuum and overpressure.

Function

A proximity sensor effects a relative distance measurement with a very high degree of accuracy. The result is independent from container height tolerances which permits to determine the closure deformation and to compare the obtained result with programmable limit values. The control unit evaluates exceeding or not reaching the limits as a fault, counts the fault accordingly and generates a rejection signal.

The module is also able to detect missing closures or canted closures inclined in moving direction and controls the rejection of such containers.



Foil (optional)

The closure detection checks the presence of foils with diffuse reflection characteristics on containers.
Its function principle is the same as that of a label detection on the conveyor (⇒ Label detection (BA), page 68).

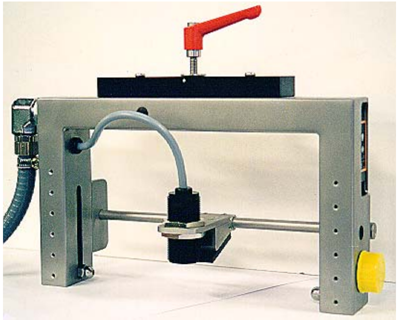
HEUFT *sonic* (optional)

The closure detection *sonic* checks containers for incorrectly placed crown corks or twist-off closures (so-called "bullnoses"). Leaking containers are also detected if the container is normally under pressure at the detection position, e.g. after the pasteuriser.

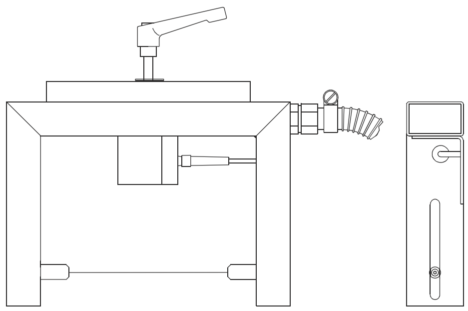
Function

This detection excites the closure by means of an electromagnetic pulse and analyses the acoustic response signal from the closure. The pitch of the excited closure is dependent on its bulging or its tension as a function of container inside pressure.

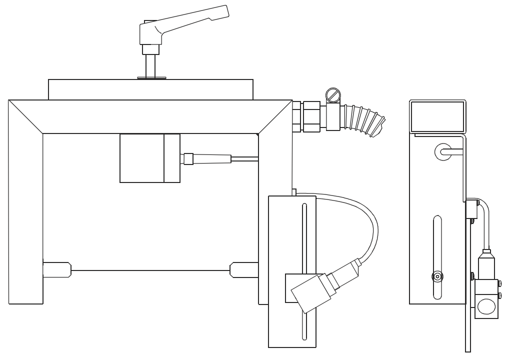
The evaluation software obtains the characteristic values from the signal and compares the results with the programmable limit values. Faulty containers are detected and rejected from the stream of good containers.



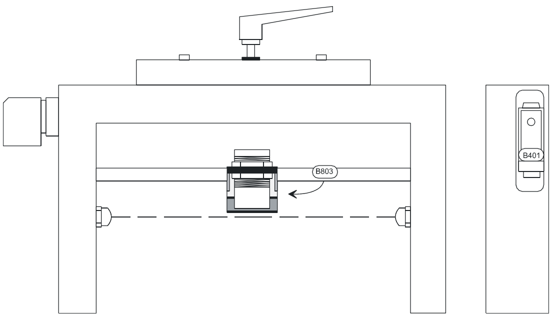
Survey of the different measuring bridges for closure detection (BA)



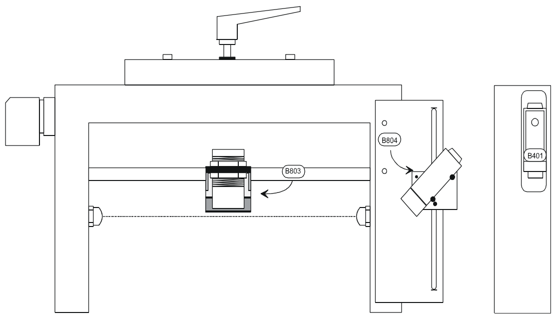
Closure Detection, Inductive, Bottles



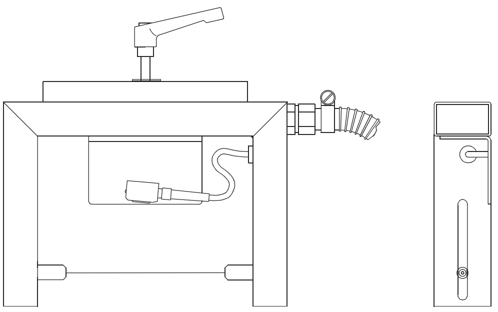
Closure Detection, Inductive, Bottles + Foil



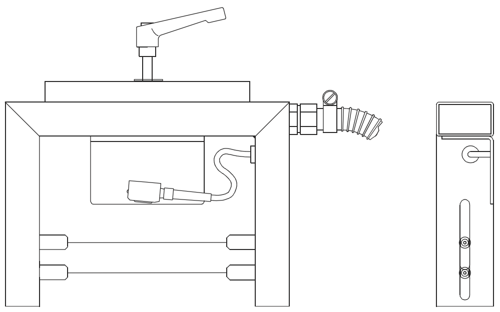
Closure Detection, Inductive, Cans



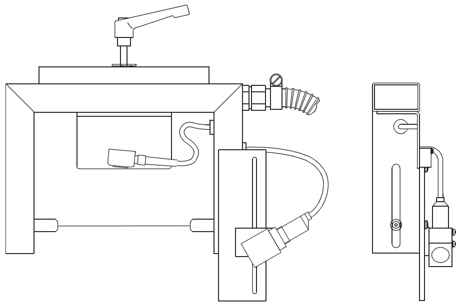
Closure Detection, Inductive, Cans + Foil



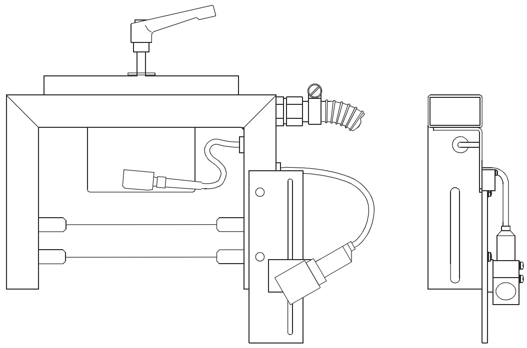
Closure Detection, Optical



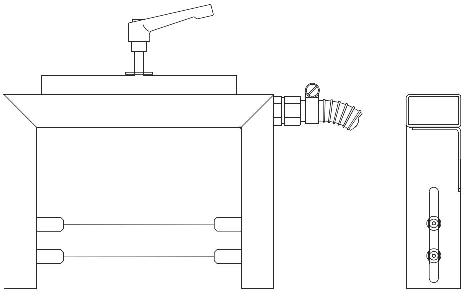
Closure Detection, Optical + Excessive Height



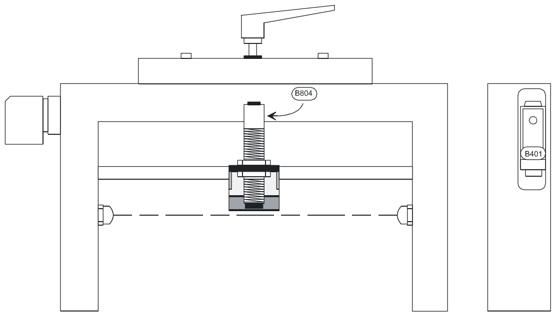
Closure Detection, Optical + Foil



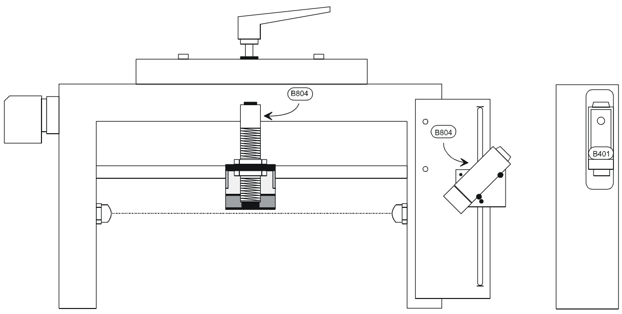
Closure Detection, Optical + Excessive Height + Foil



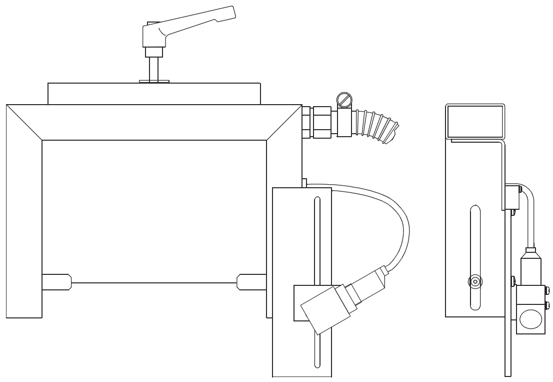
Closure Detection - Excessive Height



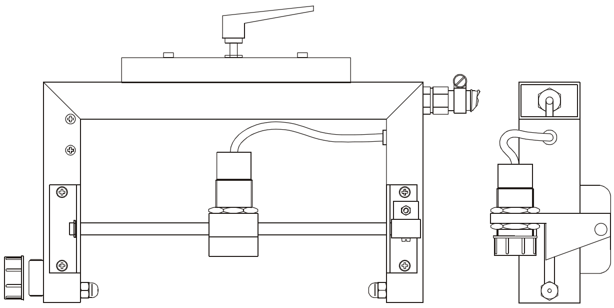
Closure Detection, Pressure



Closure Detection, Pressure + Foil



Closure Detection - Foil



Closure Detection, *sonic*

Closure detection (VF)

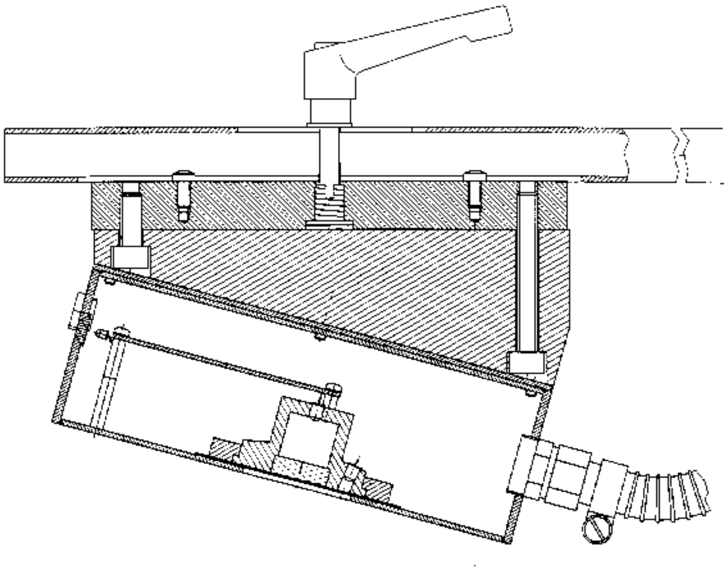
Optical, empties (optional)

The optical closure detection (empties) checks the presence of residual closures on empty containers.

Function

The closure detection sensor is installed at the second measuring bridge in moving direction. The sensor is enclosed in a casing and tilt in an angle of 15° toward the container finish. It consists of a ring of seven emitter diodes which are arranged co-axially around a receiver diode.

The control unit evaluates a closure detected by the sensor as a fault, counts the fault accordingly and generates a rejection signal.



Closure detection, optical empties

Fill level detection (BA)

HF (optional)

The measuring bridge determines the fill level in non-metal containers or containers with non-metal check surfaces filled with water based liquids, mainly soft drinks or beer.
The measuring bridge is used to detect underfills and overfills (optional).

Function

Every passing container changes the electric field of the measuring bridge in a particular form. Positive or negative fill level deviations are detected as an influence on the electric field. The amount of the influence is a direct measure for the real fill level. After comparison of the measured values with the programmed values, the control unit decides whether a container is underfilled or overfilled.

The high frequency measuring bridge is available in two variants:

HF measuring bridge KT

HF measuring bridge LT

The nominal fill level and the container shape are the determining factors for the choice of a variant.

Fill level detection (BA) and residual liquid detection (VF)

Gamma (optional)

The **Gamma fill level detection** checks the fill level in metal or non-metal containers in order to detect underfills or (optionally) overfills.

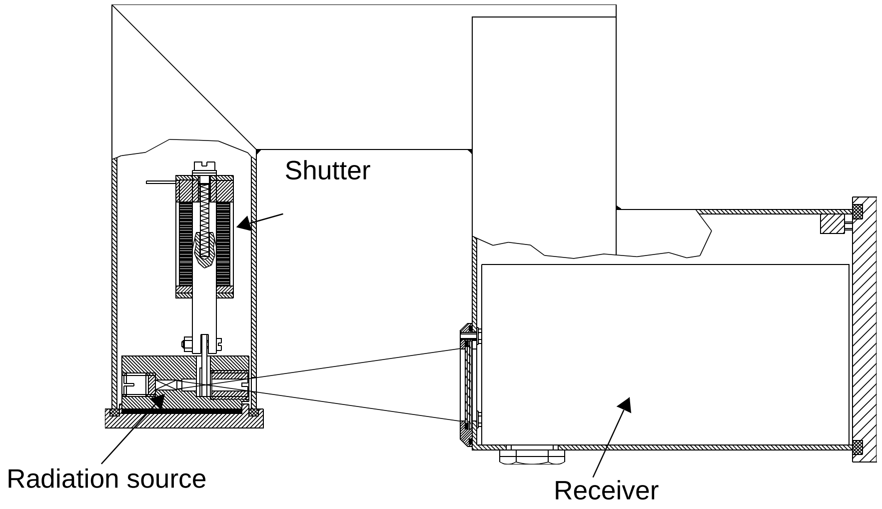
The **residual liquid detection Gamma** is used to determine the amount of residual liquid (lye, acid, water or other) inside containers.

Function principle of both modules

The measuring bridge consists of an emitter and a receiver. The emitter is a radioactive radiation source emitting gamma rays. The receiver mounted at the opposite side of the measuring bridge receives the radiation.

When a container enters the area of the radiation beam it absorbs part of the emitted gamma radiation. The absorption of containers filled at the nominal fill level as against underfilled containers or of empty containers as against those with residual liquid is different. The control unit converts the difference of the pulse rate measured at the receiver with the programmed pulse rate of the nominal fill level or a container without residual liquid into a good/bad decision.

Radioactivity!
Do NOT put your hands in the radiation area unless the green light is on (shutter closed). The orange light (in GB: red) is out in this case.
ONLY persons trained and licensed by HEUFT Company for repair of radioactive devices are authorised to open the measuring bridge.



For operator safety the emitter is equipped with a shutter. The shutter is always closed when the device is switched off. During operation, it can at any time be closed by manual switches so that there is no danger for operators during maintenance or changeovers. The shutter can also be closed automatically when there are larger gaps in the production flow. The shutter status is displayed by a two-colour light which can be seen from a distance.

Status green:	shutter closed
Status orange (in GB: red):	shutter open

The operation of a device with a radioactive source requires in most countries a special permission by the competent governmental authorities. In some countries an additional radiological safety officer is prescribed for the operating factory.

On request, HEUFT SYSTEMTECHNIK GMBH will provide the customer with the required documentation to obtain the licence.

X-Ray (optional)

The fill level detection with X-radiation measures the fill level in all kinds of containers (e.g. cans, bottles, metallised glass containers or plastic containers). The containers can be filled with liquids that consist mainly of water, but also with substances containing little or no water (e.g. oil, instant soups, powder), or substances that are filled into liquids, such as canned vegetables.

X-radiation!
Do NOT put your hands in the radiation area unless the green light is on (shutter closed). The orange light (in GB: red) is out in this case.
ONLY persons trained and licensed by HEUFT Company for the repair of X-ray devices are authorised to open the measuring bridge on the emitter side.

One shutter switch is installed on each side of the conveyor.
This switch has the positions "0" and "1".

0=	Radiation area closed	Status: green
1=	Radiation area open	Status: orange (in GB: red)

Switch used in Germany

Switch used outside Germany

This ensures that the operator always has access to one of them if it is necessary to deactivate the tube. The X-ray tube can only be started when both switches are in the "1" position.

Radiation is only emitted when

- the detection module is switched-on,
- the conveyor is in operation,
- containers are passing the measuring bridge.

Safety regulations

Most countries require a special permission by the competent governmental authorities for the operation of a device with an X-ray source. In some countries an additional radiological safety officer is prescribed for the operating factory.

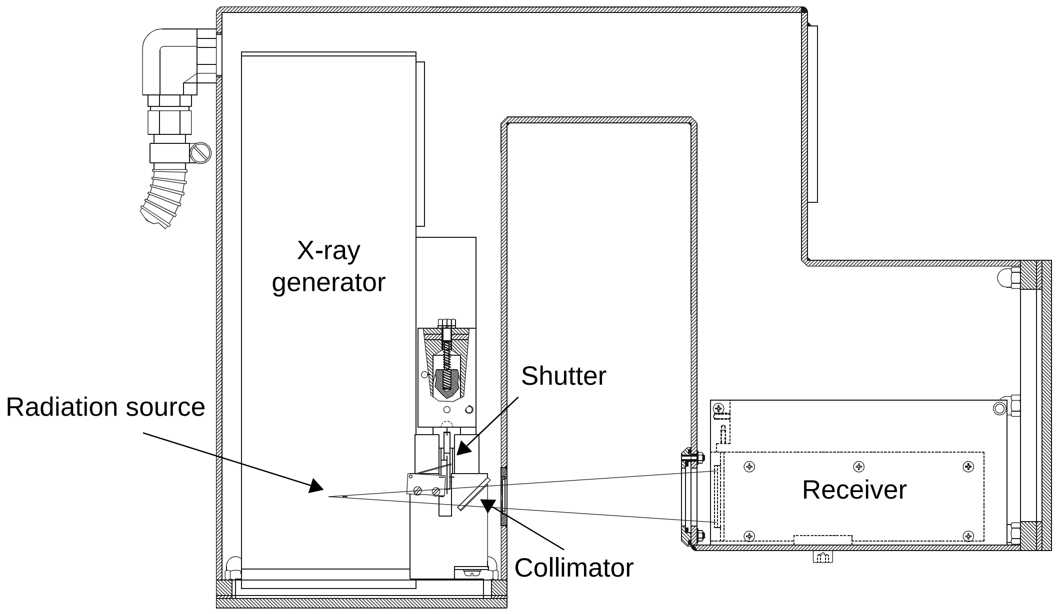
On request, HEUFT SYSTEMTECHNIK GMBH will provide the customer with the required documentation to obtain the licence.

The requirements and safety regulations laid down by the competent authority and in the directives for X-radiation protection as well as the country-specific regulations when the device is operated outside of Germany must be strictly adhered to.

Function

The measuring bridge consists of an emitter and a receiver. The emitter is an X-ray generator emitting X-rays which are entered into the receiver. The receiver mounted at the opposite side of the measuring bridge receives the radiation.

The emitter is a radiation source which emits a cone-shaped radiation area when the detection is switched on. A container which passes this radiation area absorbs radiation. The absorption values vary according to the fill level. The receiver measures these values at the opposite side of the measuring bridge and the standard device compares these with the limit values entered. Faulty containers are identified by their considerably deviating measuring results and then rejected.



Rating for the X-ray generator unit

Maximum operating value of the X-ray generator:	60 kV at 15 µA

The size of the radiation exit angle is limited by a collimator:

Diameter of the surface "A" exposed to radiation on the emitter side:	12.67 mm
Diameter of the surface "B" exposed to radiation	
at the standard passage width 90 mm (∅):	24.93 mm
at the maximum passage width 150 mm (∅):	32.67 mm
Manufacturer of the X-ray generator unit 1/15-LTFM 71	HEUFT SYSTEMTECHNIK GMBH
Qualification approval:	RP01/99/Rö

Safety concept

The safety regulations stipulated in the technical documents must be strictly adhered to.

X-ray fill level detection	⇒ Technical Documents X-ray *basic* (HBD910804)

RB *basic* V8.00

Fill level detection - Infrared

The "Fill Level Detection - Infrared" checks transparent containers for underfills or overfills. The function module can only be used for non-foaming water-based products (e.g. soft drinks and wine).

Function

The photocell is interrupted when water is present. Depending on the vertical adjustment of the photocell the system is able to detect and evaluate underfilled and overfilled containers.

Water absorbs the light beam — Light beam runs through the underfilled container

Detection of underfilled containers

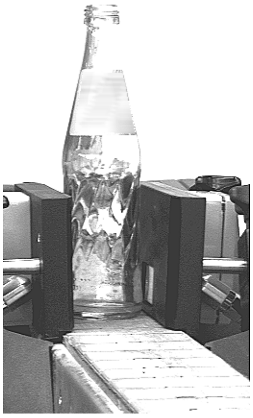
Light beam runs through the correctly filled container — Water of the overfilled container absorbs the light beam

Detection of overfilled containers

Residual liquid detection (VF)

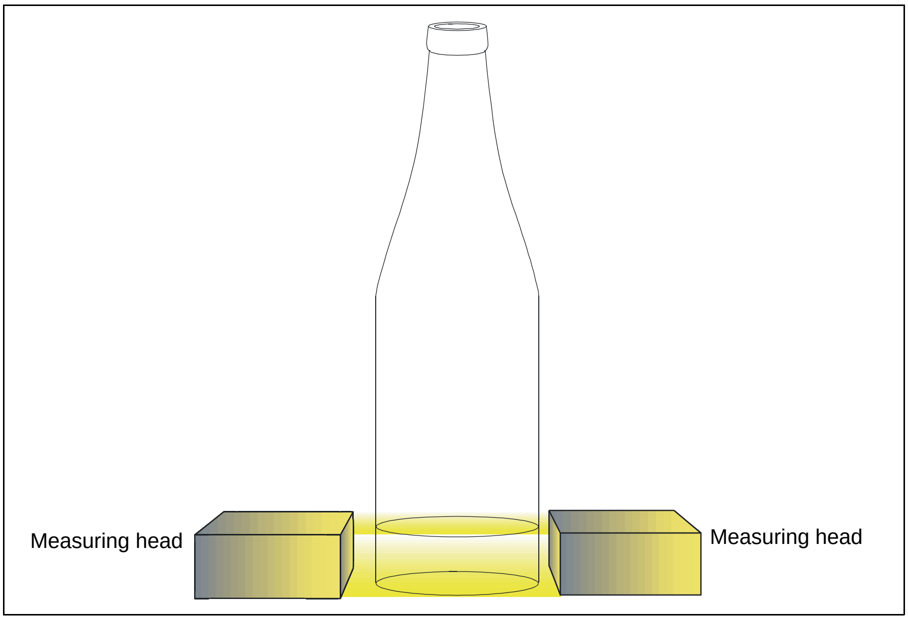
HF (optional)

The residual liquid detection, HF checks non-metal containers with a high degree of accuracy for the presence of very small amounts of residual liquid.



Function

Two measuring heads, an emitter and a receiver, are mounted on both sides of the conveyor at the height of the container base. The HF coupling between the two measuring heads is measured. When a container with residual liquid passes between these measuring heads it changes the coupling between the emitter and the receiver. The magnitude of the change is the measure with which the control unit compares the obtained result with preset values and then decides whether a container is to be rejected as faulty or not.



Principle of the HF residual liquid detection

RB *basic* V8.00

Filler monitoring (BA)

Locator (optional)

The locator permits monitoring the individual filler valves and identifying non-performing valves in the filler.

Function

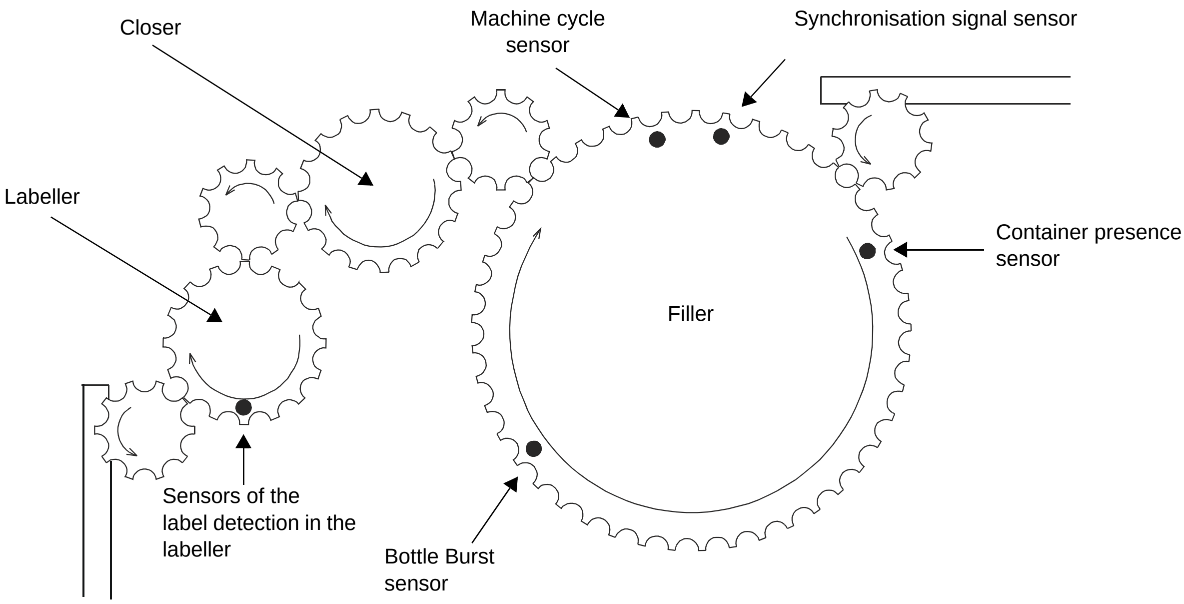
A special procedure permits tracking every container that has passed the fill level detection back to the corresponding filler valve. The control unit allocates every filling process to a particular valve.

As in practice a false filling does not necessarily mean a defective filler valve, the registered false fillings are compared against the correct fillings.

The incorrect fillings are evaluated against the correct fillings in a ratio of 16:1 (a counter is increased by 16 with every incorrect filling, the counter is decreased by one with every correctly filled container; i.e. 16 good containers eliminate one fault). The system emits an output signal when the counter value is higher than the programmed maximum number of serial faults x 16.

The front panel displays the last 9 valves where the programmed number of serial faults was exceeded. The front panel also permits to select a display indicating the 10 worst valves for overfills and underfills each. The display shows the valve numbers and the percentage of these valves in comparison to the respective fill level counters.

This fault evaluation enables preventive maintenance, e.g. the replacement of non-performing valves.



Bottle Burst

Check (optional)

The Bottle Burst check module detects burst containers in the filler and controls the rejection of containers with a risk of containing glass fragments.

Precautionary rejection of bottles filled in the area of the burst bottle in order to avoid the passing of bottles containing glass fragments into the stream of production.
During three revolutions a certain number of containers is rejected. Two options are available for selection (⇒ Bottle Burst check (optional), page 315):

Setting:	"0"		"1"	
	Number of containers		Number of containers	
Revolution 1	3	Burst position each with one adjacent container	5	Burst position each with two adjacent containers
Revolution 2	1	Burst position	3	Burst position each with one adjacent container
Revolution 3	1	Burst position	1	Burst position

Function

Two proximity switches are installed in the filler. The first one registers all bottles entering the filler, the second all bottles leaving the filler. When the infeed sensor (container presence) registers a container which is not detected by the exit sensor (Bottle Burst), this container must have burst within the filler. According to the programming (x containers per y filler rounds) the rejector will reject these containers regardless of whether they are faulty or not.

Forced underfill (optional)

The Bottle Burst forced underfill module permits the controlled underfill of containers with a risk of containing glass fragments and the activation of a shower to clean the area in the filler where glass fragments are likely.

Function

After the BOTTLE BURST check module has reported a burst container, all containers to be rejected according to the programming are subject to forced underfill. For this purpose, a potential-free signal is transmitted to the filler which in turn closes the corresponding valves.

The module also transmits a potential-free signal to activate a shower (water gushes after the priming area or shower for the appropriate spraying of valves between the infeed and the outfeed starwheel).

The shower signal is available in the machine round where the burst container was reported for a duration of seven machine cycles, i.e. the three positions prior the burst container, this position itself and the three positions after the burst container will be showered.

Label detection (BA)

General

The sensors for the label detection are either installed at the measuring bridge of the device or in the labeller.

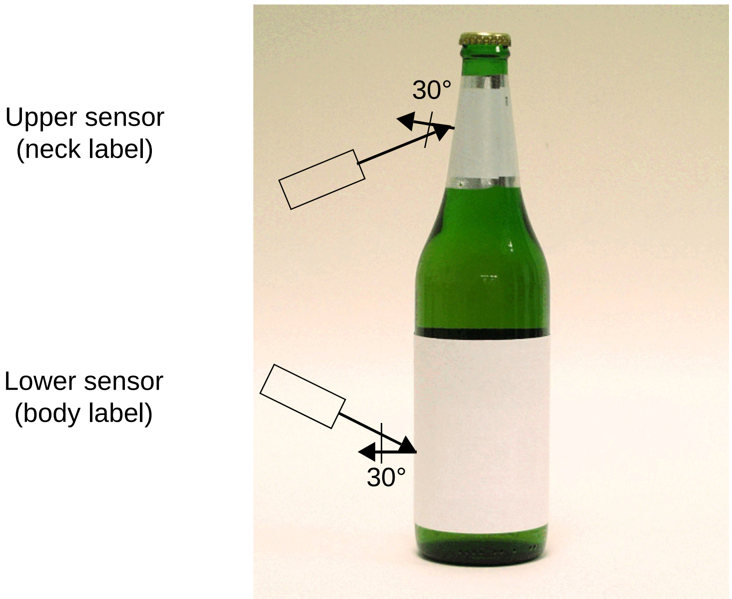
Function

Label detection is carried out by means of reflecting photocells installed inclined towards the container axis according to the label to be checked. The evaluation is based on the different reflection characteristics of labels and container surfaces.

Even glass reflects according to the physical law: angle of incidence = angle of reflection, paper labels have a diffuse reflection in all directions so that the labels reflect enough light back to the photocell.

Photocell alignment

A photocell must be adjusted so that the light beam hits the centre of the label at an angle of about 30°:



Label detection at the conveyor - all-around + partial + foil (optional)

This detection module checks the presence of labels with diffuse reflection characteristics on the conveyor after the labeller.
The labels must be larger than one half (180°) of container circumference.

One or two photocells are installed at the measuring bridge for every label to be checked. All photocells are aligned so that the light beam hits the respective label at an angle of about 30°.

Label detection in the labeller, label + foil (optional)

The label detection checks the presence of labels with diffuse reflection characteristics in the labeller.

One photocell is installed in the labeller for every label to be checked. All photocells are aligned so that the light beam hits the respective label at an angle of about 30°.

Serial fault in the labeller (optional)

The serial fault detection generates a stop pulse for the labeller when successive label faults occur. This quick reaction prevents the production of a large number of containers without a label.

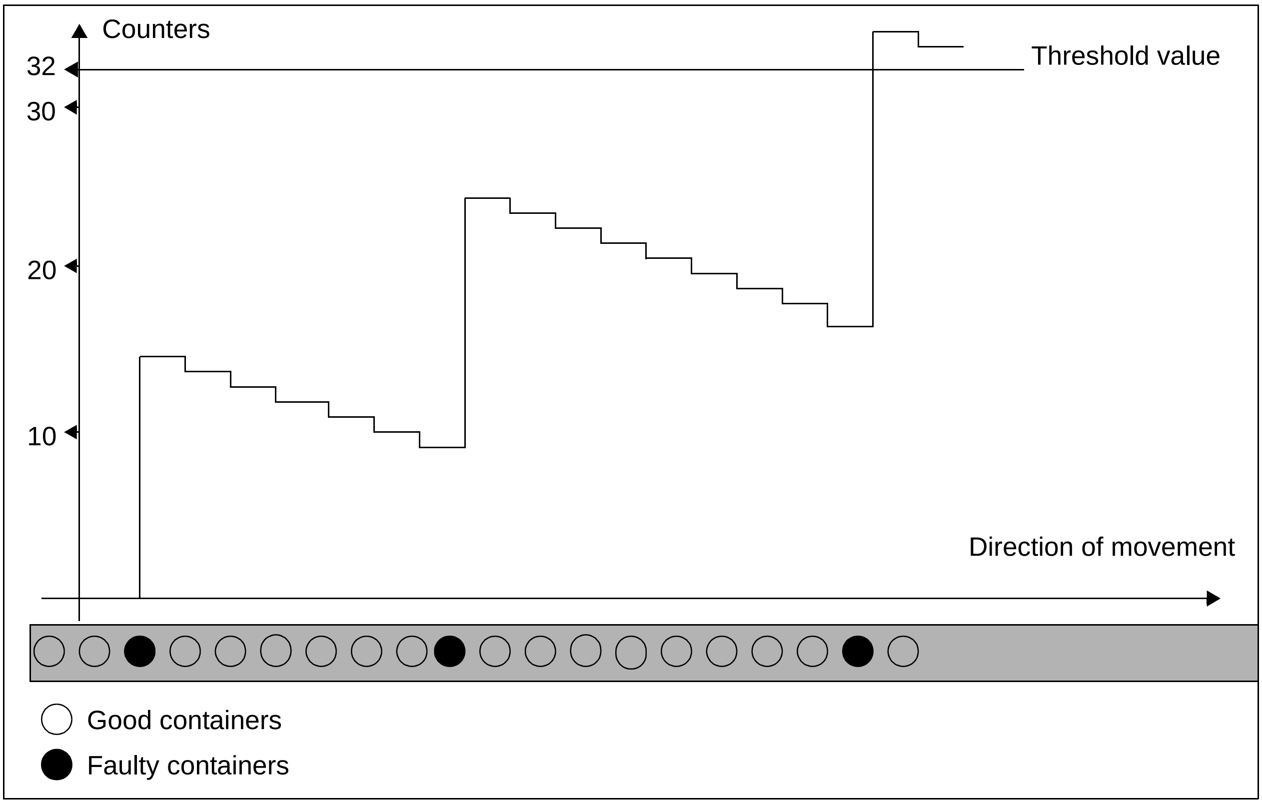
Function

Every missing label at a container increases a counter in the control unit (only one fault per container will be evaluated). The faults are evaluated in a ratio of 16:1 as against good containers (the counter will be increased by 16 in case of a fault, it will be decreased by 1 in case of a good container; i.e. 16 good containers will eliminate one fault). The system emits a stop signal when the counter value exceeds the programmed maximum number of serial faults x 16.

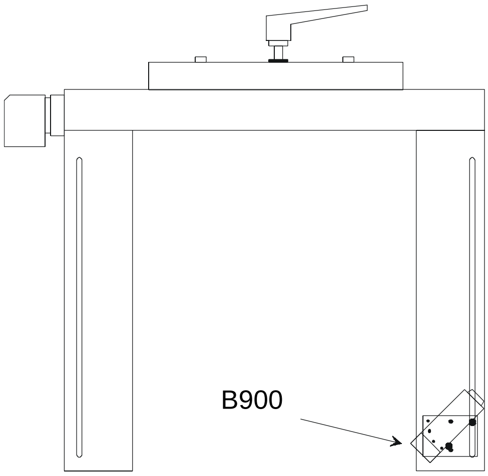
Only multiples of 16 such as 16, 48, 32, ... 120 can be entered as threshold value. 240. The maximum threshold value is 240. The maximum serial fault value must be set:

Maximum serial fault	1	2	3	4	5	...	10	...	15
Threshold value for the emission of a switch-off pulse	16	32	48	64	80	...	160	...	240

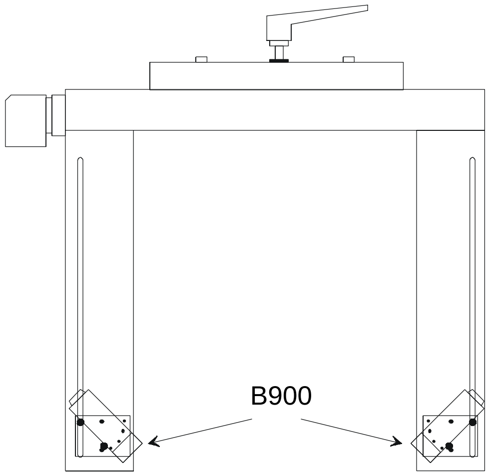
Exceeding the threshold value of 32 in the case of a maximum serial fault value of 2



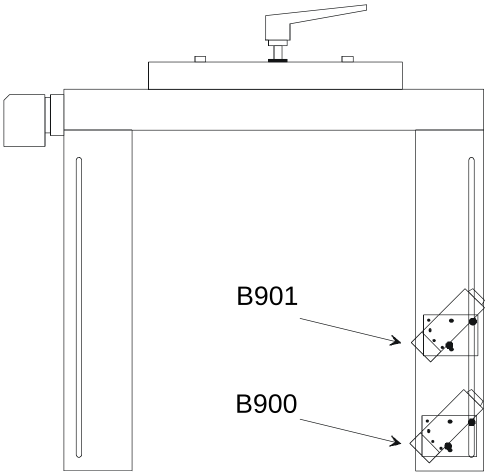
Survey of the different measuring bridges for label detection



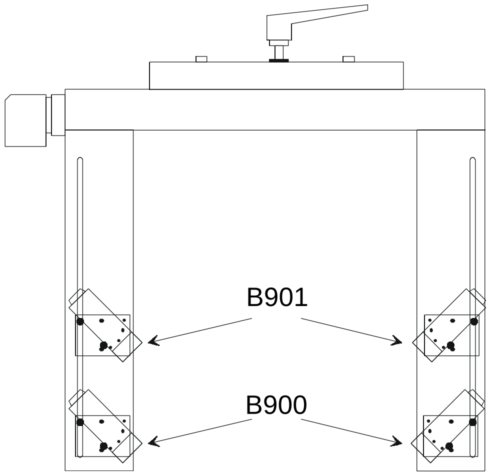
Label detection, all-around label



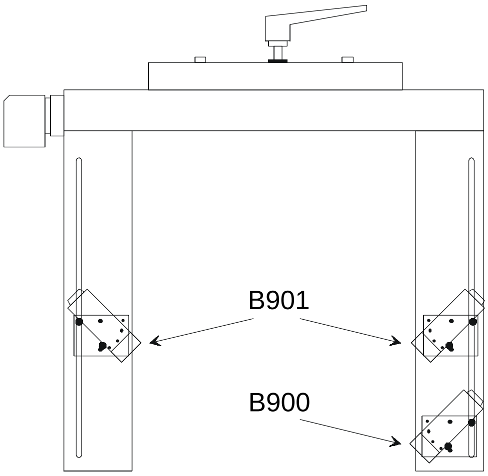
Label detection, partial label



Label detection, 2 all-around labels



Label detection, 2 partial labels



Label detection, all-around and partial label

Laning (VF)

Variable (optional)

Distribution of containers to two lanes in a ratio to be programmed as desired.

Function

The device registers every container entering the check area and allocates it to one of the two lanes. The conveyor where container transport takes place when the rejector is in the retracted condition is designated as lane 1. Accordingly, the conveyor where the container transport takes place when the rejector is in the extended condition is designated as lane 2.

The distribution is carried out in a ratio to be programmed as desired. Jam detectors monitor both lanes. When these switches detect and signal a container jam on one of the lanes, the distribution to the corresponding lane is suppressed. When both lanes are blocked, the device emits a fault message and transmits a signal which can be used to stop the conveyors.

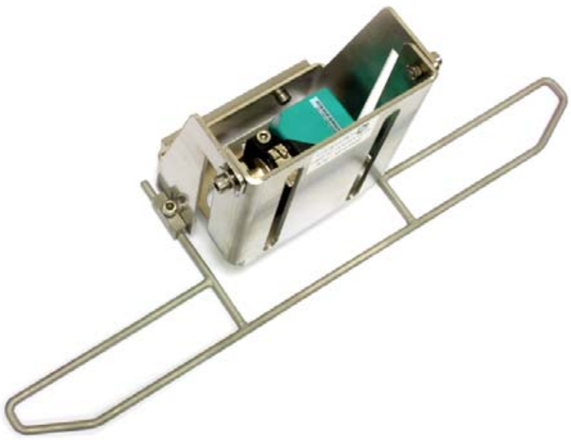
When several detection modules are linked together via the "laning, variable" module, detected faulty containers can be excluded from the standard laning ratio and be rejected to one of the two lanes as desired.

Jam detector (optional)

When there is a container jam on a distribution lane, the jam switches transmit a signal to the control unit. The corresponding lane is excluded from the laning process as long as the jam condition exists. When all lanes are jammed the system generates a switch-off pulse and emits a message.

Function

The jam detector is mounted to the conveyor guide rails. In case of a jam the bow of the jam detector is moved by the impact pressure of the containers and remains in the switched condition as long as the jam exists. The switched condition is transferred to the control unit as internal input signal.



Jam detector

Acceptance of an external signal

Signal acceptance at the conveyor (optional)

The module permits the acceptance of an external signal in the conveyor area which can be used either as fault or laning signal (option VF) or only as fault signal (option BA).

Function

The device accepts a potential-free signal in the check area. The signal is sampled during a maximum distance of 190 mm and evaluated according to the programmed specification. The time measurement (delay and signal length) facilitates the setting of detection parameters. The system emits the corresponding messages when parameters are not permitted.

The optional processing of continuous signals or container dependent pulses is possible. The signal acceptance is completely independent from other detection modules.

Signal acceptance in the machine (optional)

The module permits the acceptance of an external signal in the machine cycle area which can be used either as fault or laning signal (option VF) or only as fault signal (option BA).

Function

The device accepts a potential-free signal in the machine cycle area. The signal is sampled during the entire period of a machine cycle and evaluated according to the programmed specification. The time measurement (delay and signal length) facilitates the setting of detection parameters. The system emits the corresponding messages when parameters are not permitted.

The optional processing of continuous signals or container dependent pulses is possible. The signal acceptance function is completely independent of other detection modules.

Rejectors

General

The rejectors *DELTA-FW, DELTA-K*, *mono* and *pusher* reject containers from the flow of production containers to a parallel conveyor, a collecting table or into a waste container.
The rejectors *DELTA-FW, DELTA-K* and *flip* reject containers in upright position to a parallel conveyor. The rejectors *mono* and *pusher* reject primarily into a waste container.

DELTA-FW **rejector**

DELTA-K **rejector**

mono **rejector**

pusher **rejector**

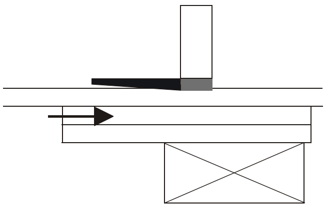
flip **rejector**

Function

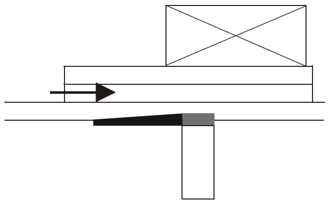
Data is collected for every passing container at the individual detection positions. The control unit decides whether the container should be rejected on the basis of this data.
The rejector only operates mechanically when upstream detection modules signal a faulty container and the rejector receives a rejection signal from the control unit.

Types of rejector

Rejectors can generally reject to the **right** and to the **left**.



Rejection to the right



Rejection to the left

An encoder is used to adapt the rejector automatically to variable conveyor speeds. The individual rejector segments are extended or retracted by pistons in pneumatically controlled high speed cylinders.

DELTA-FW **rejector in eight variants**

The rejectors are distinguished by their maximum nominal output in ***DELTA-FW*24** with 24.000 containers per hour and ***DELTA-FW*** with 72.000 containers per hour.
The **number of segments** to create the rejection curve (10 or 16 segments) combined with the type of **brushes** for the individual segment tips (none or 3 brush surfaces per segment) result in the eight possible variants.
The higher the container speed the less rejector segments are required for the rejection process by the *DELTA-FW* rejector.
The number of segments is determined by the distance the containers must be rejected away from the stream of production.

max. container diameter 90 mm	10 segments
container diameters from 90 - 120 mm	16 segments

The brushes smoothen the rejection process and are used for installations with a low capacity.
The *DELTA-FW* Fast rejector is available as additional variant for installations with higher capacities (> 1,2 m/ second) with round containers.

***DELTA-K* rejector in six variants**

The rejectors are distinguished by their maximum nominal output in ***DELTA-K24*** with 24.000 containers per hour and ***DELTA-K*** with 72.000 containers per hour.
They are also distinguished by the reject direction right or left and by the **number of segments** which form the rejection curve (14, 15 or 16 segments).

The number of segments is determined by the distance the containers must be rejected away from the stream of production. In case of installations producing different brands, the number of segments is determined by the largest production container.

Container diameter up to 80 mm	14 segments
Container diameter up to 95 mm	15 segments
Container diameter up to 110 mm	16 segments

The *DELTA-K* rejector can be delivered with or without an adjustment device. A vertical and/or a horizontal adjustment device are available.

mono*, *pusher* and *flip

The rejectors are distinguished according to their maximum nominal output in ***mono24***, ***pusher24*** and ***flip24*** with 24,000 containers per hour and
mono, pusher and ***flip*** with 72,000 containers per hour.

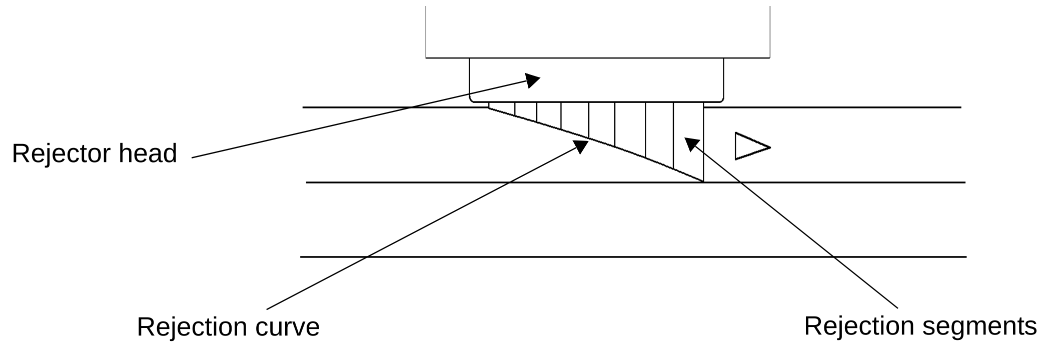
The *mono* rejector is supplied to reject to the right and, if required, can be modified on location to reject to the left.

The *flip* rejector is delivered with or without a vertical adjustment device.

DELTA-FW (optional) and *DELTA-K* (optional)

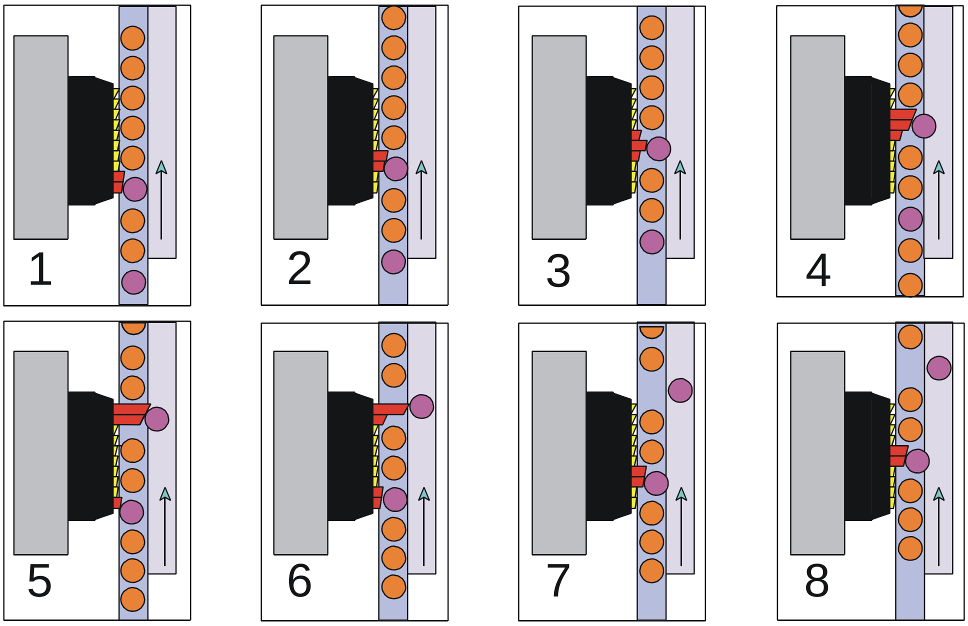
The rejector head forms a rejection curve directly above the conveyor along which the containers are guided. The rejection curve is divided into individual sections. It is the result of the different length of every single segment.
The segments are moved by pneumatically operated high speed cylinders when the rejector receives a control signal.
When several containers to be rejected immediately follow each other the rejector receives only one control signal and the segments remain extended until the rejection of the last container.
The bottom photocell used in conjunction with the *DELTA-FW* rejector detects containers lying on the conveyor or foreign objects. The *DELTA-FW* rejector removes these objects from the conveyor.

The optional bottom photocell of the *DELTA-K* rejector detects too low containers, containers with a broken neck and foreign objects that reach up to the height of the extended segments. The *DELTA-K* rejector removes these objects from the conveyor.



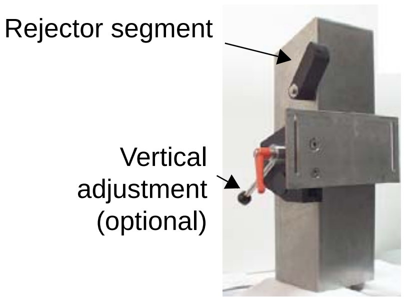
DELTA-FW and *DELTA-K* rejection principle

During the rejection process the variable extension of the segments forms a rejection curve which seems to move. The containers are smoothly guided along this curve without falling down.

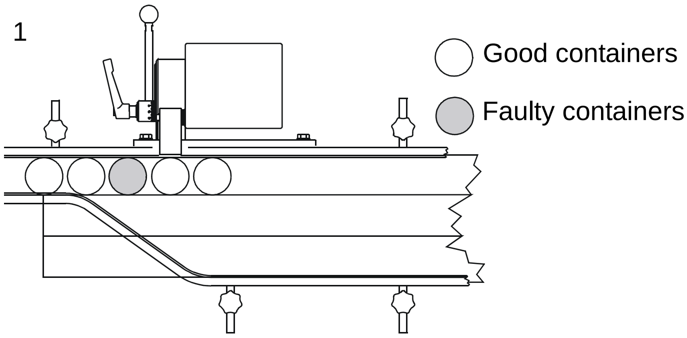


flip (optional)

The impulse of the rejector segment accelerates the faulty container laterally to the production flow,
Due to this the container is deflected from its lane and pushed into a waste container or to a parallel conveyor.



1



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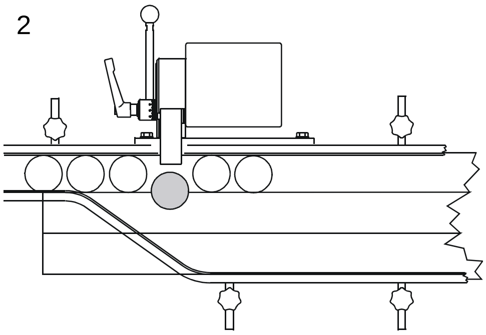

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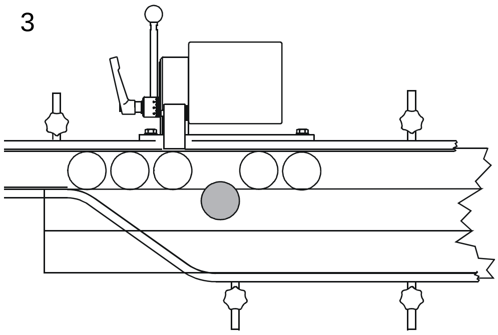
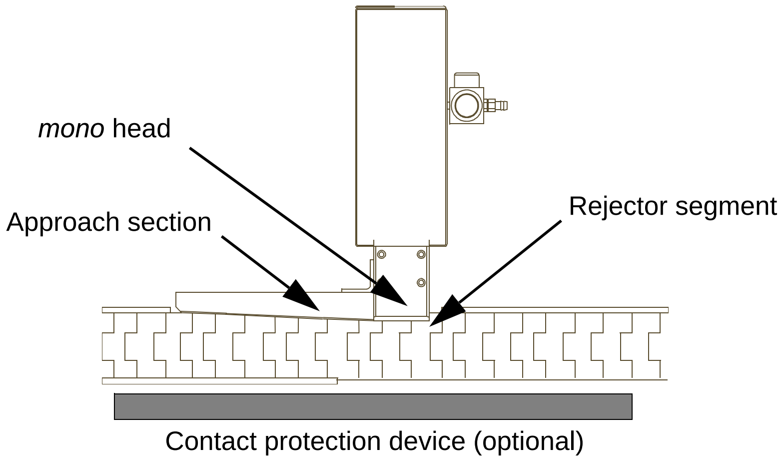


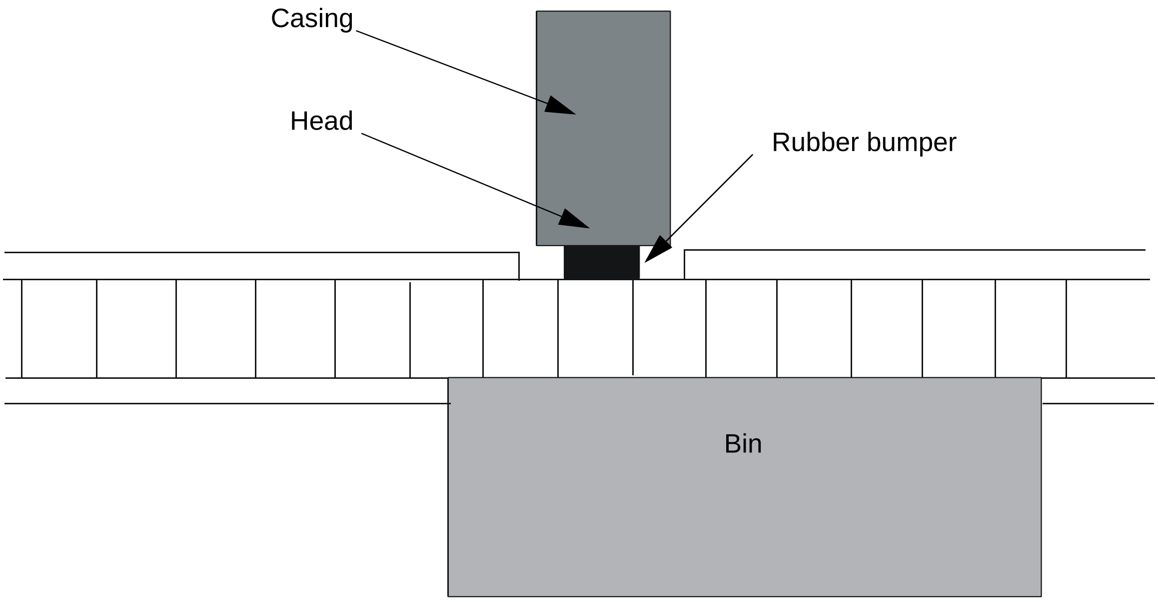
mono (optional)

The rejection segment gives the container to be rejected a defined impulse which pushes it to a parallel conveyor or into a waste container.
The approach section reduces the grip of containers on the conveyor.



pusher (optional)

The rejector segment which is a rubber bumper gives the container to be rejected a defined impulsion which pushes it into a container.

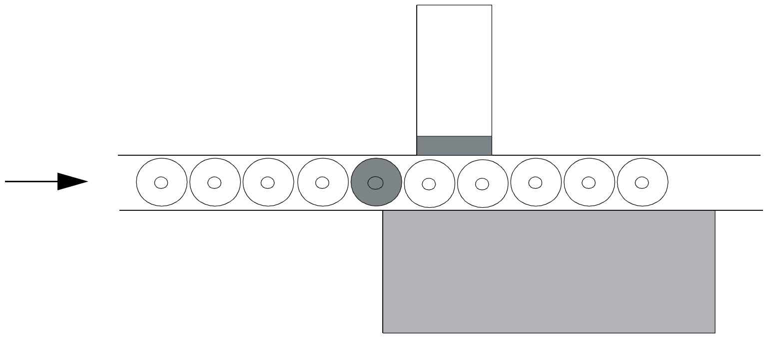


RB *basic* V8.00

mono and *pusher* rejection principle

The impulse from the rejector segment or the bumper accelerates a faulty container perpendicular to the flow of production containers. This acceleration moves the container away from its transport direction and into the waste container or to a parallel conveyor.

1



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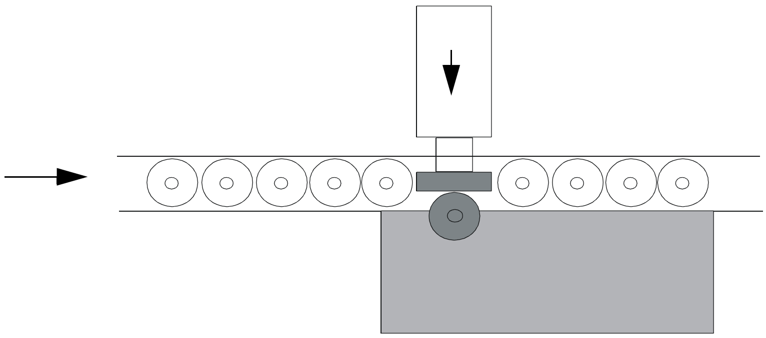

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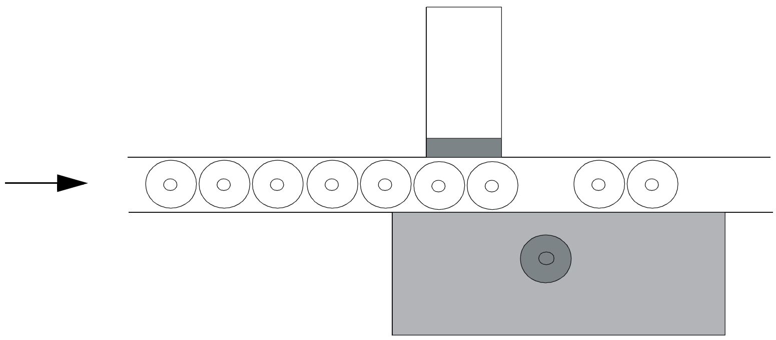


Serial fault standard

This module generates a stop pulse when frequent faults occur.

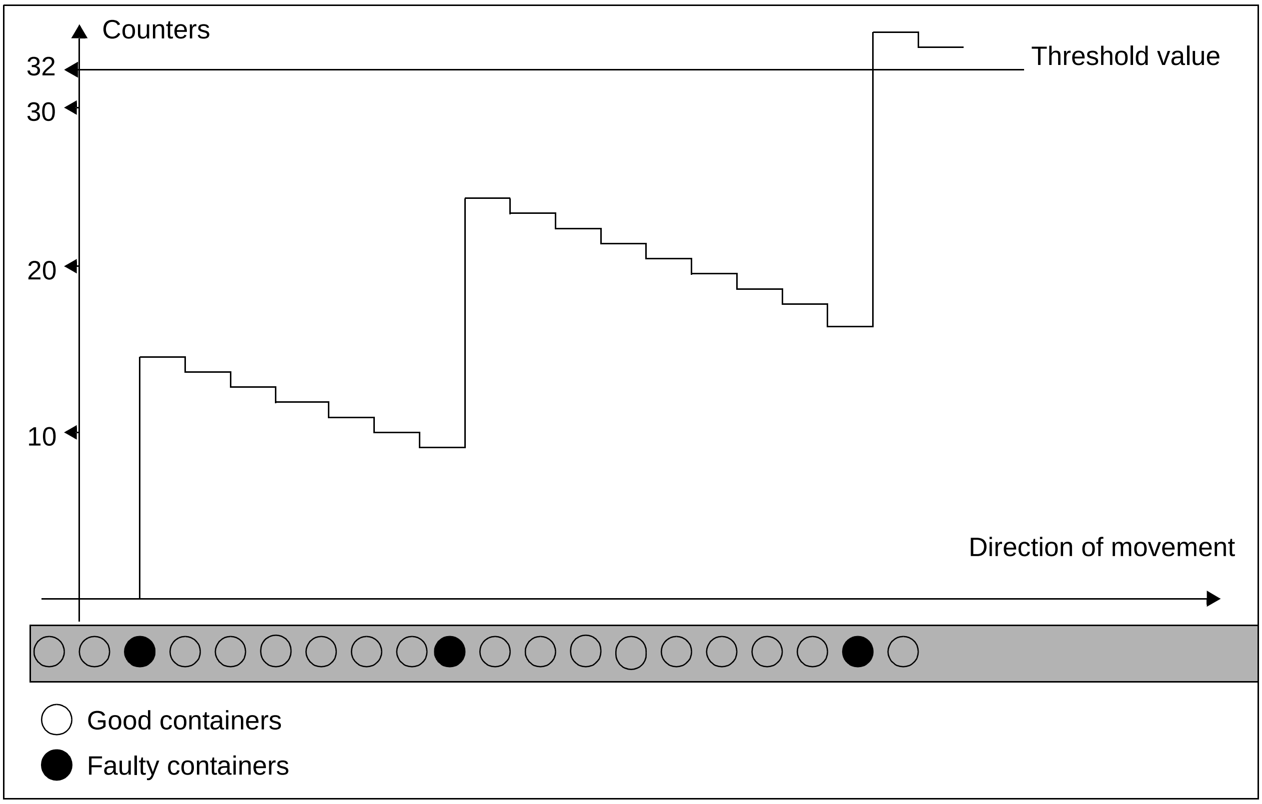
Function

Every fault detected by the previous detection modules increases a counter in the device (only one fault per container is considered). An output signal is generated when reaching a programmed limit value. This signal can be processed and be used as acoustic signal, conveyor switch-off etc.
The faults are evaluated in a relationship of 16:1 as against good containers (the counter is increased by 16 for every fault and decreased by 1 for every good container; i.e. 16 good containers eliminate one fault).
The output signal is emitted every time the counter value exceeds the programmed maximum number of serial faults x 16 (threshold value).

Only multiples of 16 such as 16, 48, 32, ... 120 can be entered as threshold value. 240. The maximum threshold value is 240. The maximum serial fault value must be set:

Maximum serial fault	1	2	3	4	5	...	10	...	15
Threshold value for the emission of a switch-off pulse	16	32	48	64	80	...	160	...	240

☞ Exceeding the threshold value of 32 in the case of a maximum serial fault value of 2



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Signals

Warning light (optional)

The warning light enables to recognise the current device status from a distance:

RED light	Overall status 2	important device functions failed or switched-off
YELLOW light	Overall status 1	Production runs with faults e.g. serial fault, Locator
GREEN light	Overall status 0	Undisturbed device function

Switch-off pulse

The switch-off pulse is an output signal which the customer may use when too many serial faults occur or when the reject verification trigger has detected a missed rejection.

Function

The system generates a switch-off pulse in case of a serial fault or a missed rejection. This pulse is available for a duration of 300 ms (LOW signal level).

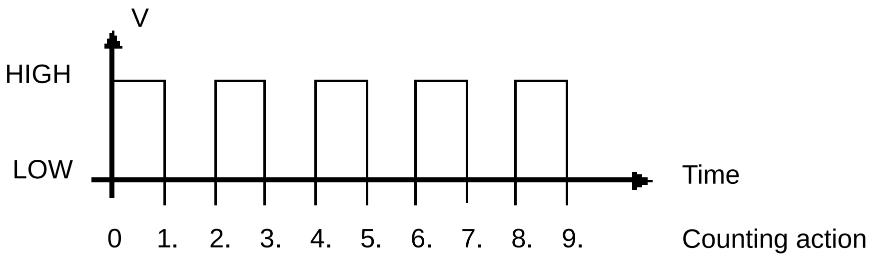
External signals

Outputs

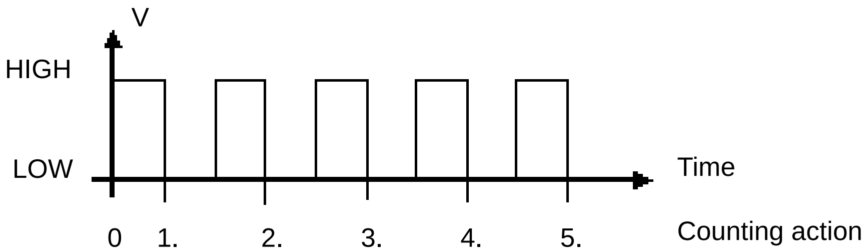
The device can transmit up to 4 unit counters to an external device, e.g. a control unit that can be programmed as required. The updating of the outputs is carried out in regular intervals of 20 ms.

The emission of count signals is possible according to two different procedures:

» **Edge triggering**
The signal is switched (inverted) with every counting process.
Both signal edges contain the counting information.



» **Pulse triggering**
In the inactive condition the counting outputs are at signal level HIGH.
With every counting process the signal switches to the LOW condition (0 Volt) for a programmable length of time (1...255 ms).



A predivisor must be specified for both procedures which determines that only every n-counting event (n = 1..255) generates the signal emission (⇒ Count signals, page 340).

Inputs

The device is able to receive up to four different count signals via an additional parallel interface. The inputs are checked in regular intervals of 20 ms. The signal acceptance is exclusively carried out according to the pulse triggering procedure.

Clear counters

An additional input and output each is available to clear the counters. The signal processing is only carried out according to the pulse triggering procedure.

- All counters of the device are cleared when the input signal is available.
- When clearing the counters of the device (via the front panel or an external clear signal), the device emits a signal (of 300 ms length) which can be used by the customer as desired.

Brands, external program change (optional)

In case of product changes, the parameter data sets for every production container can be changed by selecting the desired program by means of an external signal source. The program change via the front panel is blocked in this case.

Function

The specific parameters regarding installation, container and detection criteria are configured for every container and product type during commissioning. Each complete set of parameters is then programmed as control program. All 16 available sets of program data can be purposefully selected and activated in a coded form by means of four different signal lines The activation can be initiated by any customer device (e.g. PLC, production data acquisition system or similar devices) in form of a potential-free signal.

Mounting

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Preparations

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General

Mounting can only be carried out by a mechanic or another qualified specialist with mechanical skills. The required work includes drilling of attachment holes, sawing out sections of the guide rails and mounting the various components. One day is required to carry out this work. Temporary help by another person is required. All components of the device can be moved without hoists.

Carefully read this entire chapter before starting the mounting. It includes a detailed description of all activities. The safety regulations must be strictly followed. The careful mounting of all components is the basis for the proper function of the device.

Tool list

The following tools are required to carry out the rapid and correct mechanical mounting of the device:

tee-square		
measuring tape (2 m)		
bubble level		
scribing iron		
centre punch		
hammer		
portable drill (drill chuck 13 mm)		
drill hammer (for *DELTA-K* rejector only)		
1 set of	-	twist drills (1 to 13 mm)
	-	core drill for deburring
1 set of screw drivers each	-	flat
	-	crossed
1 set of wrenches each	-	hexagon socket
	-	open-jawed
	-	ring
metal saw		

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Choice of the mounting location

Normally the device is mounted at a single-lane conveyor. The recommended conveyor height for operator's convenience is between 800 mm and 1450 mm. A conveyor support is required below the device in order to stabilise it.
The conveyor must be horizontally aligned along the complete check area of the device.

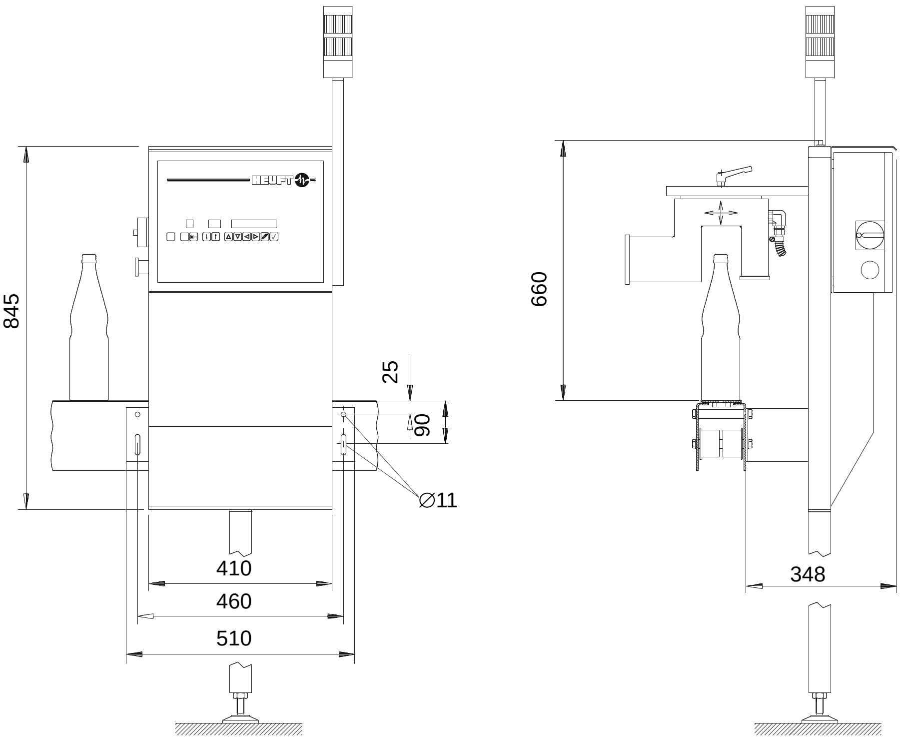
For the purpose of device stabilisation a pedestal is included in the scope of delivery of the device.

Required space

The exterior dimensions of the standard device are:

Length:	510 mm
Width:	348 mm + conveyor width
Height:	600 mm above the conveyor

Additional space is required for the rejector (*DELTA-FW, DELTA-K*, *mono*, *pusher* or *flip*). Conveyors of sufficient length or collecting tables must be provided for the installation. The minimum distance of a rejector to the preceding detection module is 200 mm.



Container transport

When machine detection modules (e.g. Bottle Burst, Locator) belong to the device, conveyor transitions between a machine exit and the device are not allowable. When several machines are to be monitored, e.g. Bottle Burst check in the filler and label detection in the labeller, the machines must be in block operation. For machine detection purposes, the sensors are installed within the respective machine.

The results obtained by the detection modules are shifted with the corresponding conveyor speed in synchronisation with the container movement. Therefore, the containers must not position slip on the conveyor between a machine exit and the device.

Conveyor speed

The conveyor speed is limited to a maximum of 1.5 m/s.
Also in case of an automatic conveyor speed control system this speed limit must not be exceeded. At this defined speed, the set output may reach up to 72,000 containers per hour.

Installations for different brands

The device can differentiate between a maximum number of 16 different production containers designated as brands. As new brand is considered every container deviating from the previous brand by one or more qualities (shape, colour, material, product, container height, container diameter, label, closure, foil).

Container shapes and dimensions

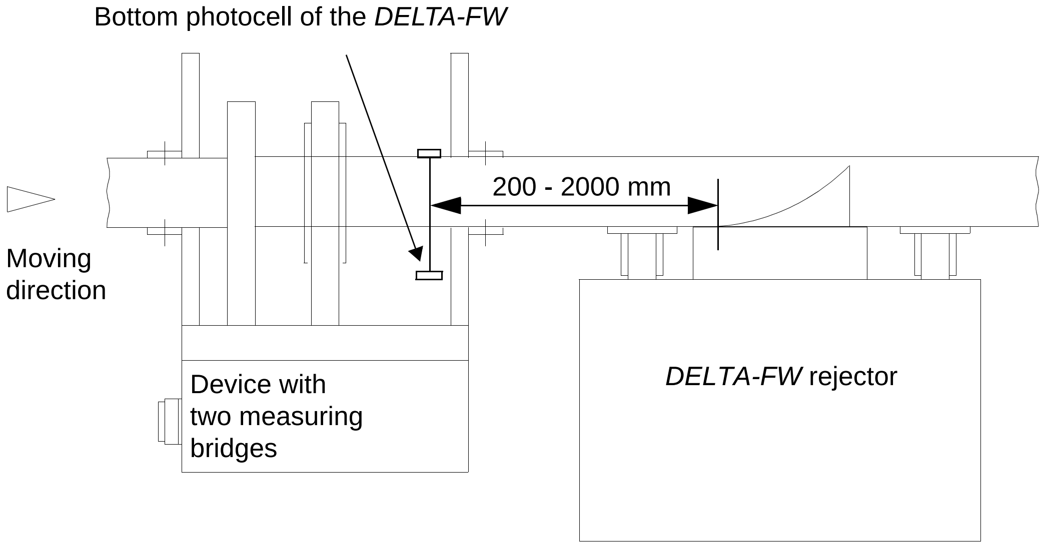
Fill level range for full container checks:	30 - 280 mm (for X-rays: 70 - 220 mm)
Vertical adjustment range:	250 mm
Maximum container height:	350 mm
Container diameter:	40 - 120 mm

Rejector

The rejection of containers evaluated as faulty during the detection process can also be carried out in a multi-lane area.

The distance between the last detection module and the rejectors must be at least 200 mm. If the distance is greater than 2000 mm, the tracking of container shifting must be carried out with an additional trigger. This trigger installed between the device and the rejector must not be closer to the rejector than 200 mm.

In the rejection area, parallel conveyors must run in mechanical synchronisation.



Distance between last detection and rejector

Check list for the mounting location	Yes
Single-lane conveyor?	
Sufficient space for the operation of the device and the rejector?	
Is conveyor support available below the device?	
Is the supply of the device according to the specifications ensured? electrical connection, fusing and requirements to protection type and shielded power supply cable	
Connection of compressed air is assured? supply pressure connection hose	
Conveyor in the entire check area is in the horizontal plane and without transitions? The check area begins at the first sensor and ends after the rejector.	
Machine detection modules are in block operation (for full container checks)?	
Uniform conveyor speeds?	
Containers do not skid on the conveyor?	
Number of detection modules is known? Distance between last detection module and rejector is at least 200 mm, maximum 2000 mm.	
Is the moving direction known?	

Further proceedings

In case of an initial installation, the following components will be mounted one after the other:

» Standard device

» Measuring bridges for detection modules

» Rejectors

» Peripheral equipment

In case of retrofitting the device, the procedure is equal to the one for an initial installation.

Each part or component should be unpacked prior its mounting. Packaging material should be returned or collected for recycling.

Mounting of the standard device

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General

The standard device with the components control unit and mechanical adjustment devices is prefabricated and can be mounted on location with little manual work.

It was considered during the construction of the device that bore holes for guide rail attachment already available in the conveyor side frames can be used for mounting.
When these bore holes are not available at the desired mounting locations or cannot be used, the required bore holes must be drilled into both sides of the conveyor at the same level according to the drilling plan.

The device is not only stabilised by the sway bracing within the conveyor, but also by a pedestal.

Do not carry out mounting unless the conveyor is stopped!

If the conveyor shape is different from the cross section shown in the illustration, the attachment in the shown form will normally not be hampered. Limitations for the operating area of the device may arise when the distance of the upper attachment hole from the conveyor surface is not adhered to.

When attaching the device to the conveyor it must be ensured that no movable parts (e.g. chain holders, deflection pulleys etc.) are jammed or damaged.

Supply lines installed within the conveyor or in its side frames such as cables or lubrication lines must be placed so that they run either below the conveyor or at its lower edge.

It is absolutely necessary for the detection quality that the programmed distances remain valid without changes even when there is a change of production container. Therefore, the device must always be mounted to a conveyor which is exactly in the horizontal plane and the device itself must also be level.

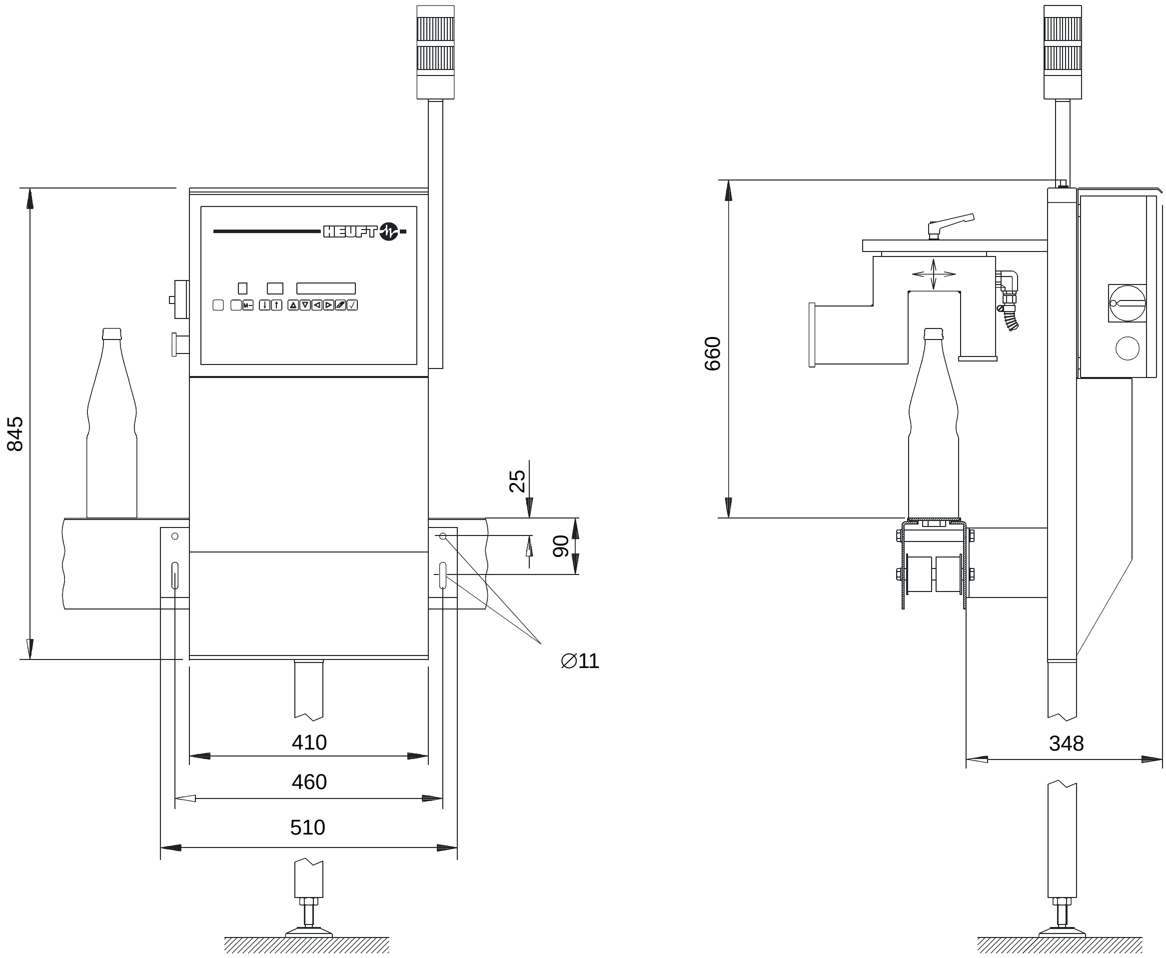
A device can be equipped with up to three separate vertical adjustment devices. The individual detection modules are attached to them so that they can be shifted laterally to the moving direction of containers. This permits the mechanical adaptation to new container dimensions in case of production changes to another brand.

Every vertical adjustment device is prefabricated. It consists of a shaft and a spindle, a bracket on a mounting plate is held in between them. The mounting plate is guided by the shaft and moved by the spindle. For this purpose, the spindle is driven from above by a crank. The vertical adjustment device is assembled for transport but must be disassembled into its single parts for mounting.

Parts of the standard device

Basic frame with control unit and pedestal (HBF150000),
Mechanical adjustment devices (number is optional, maximum 3) (HBM000020).

Construction of the standard device



Preparations

1. Removal of conveyor guide rails at the mounting location

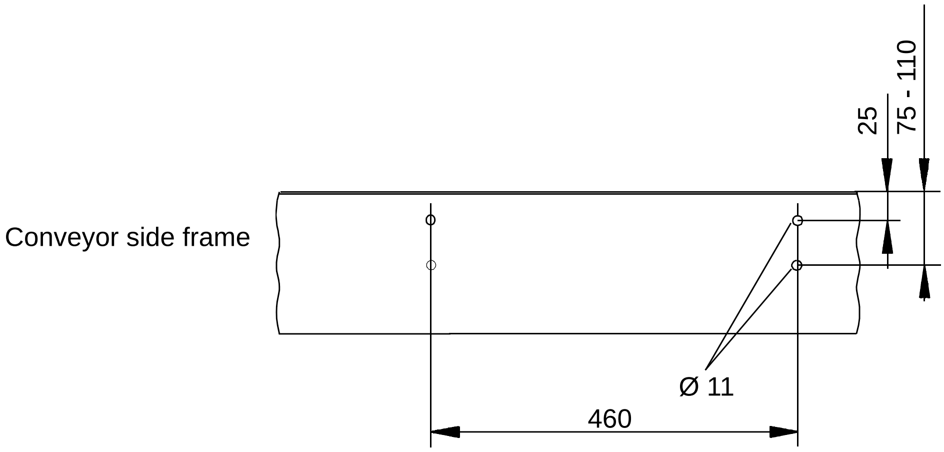
Switch off the conveyor and secure it so that it cannot be switched on again! Remove the containers from the conveyor in the mounting area.

1.1. Loosen the corresponding guide rails in the assembly area and remove them on both sides.

The designs of the individual types of guide rails vary and therefore this must be considered when assembling.

1.2. Loosen and remove the guide rail supports in the assembly area.

2. Application of bore holes for the standard device

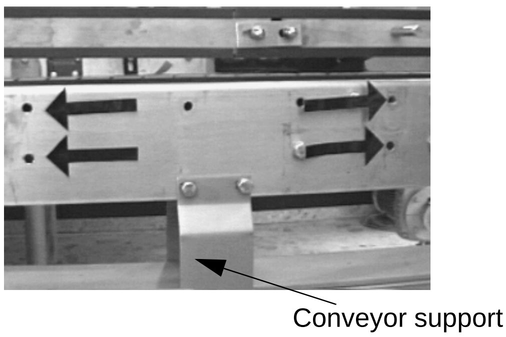


Drill plan for standard device

2.1. Compare the measurements of the drill holes for the guide rail supports with those on the drilling plan.

2.2. When the available bore holes are within the tolerances of the drill plan, continue mounting according to ⇒ Attaching the standard device, page 98.

2.3. When the bore holes are only partly available or do not have the required spacing, transfer the measures from the drill plan symmetrically and in the same horizontal plane, mark the bore holes, centre punch and drill them (11 mm drill).



Completed bore holes

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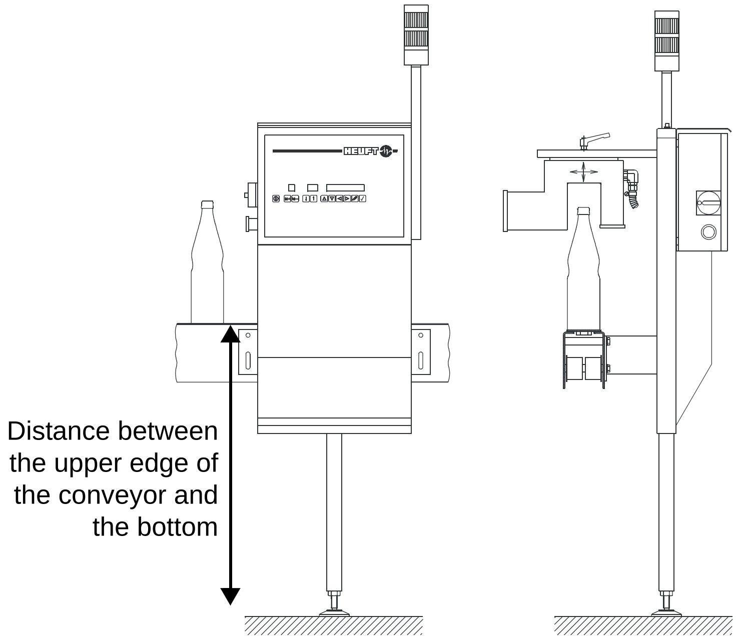
Mounting the pedestal

3. Pedestal attachment

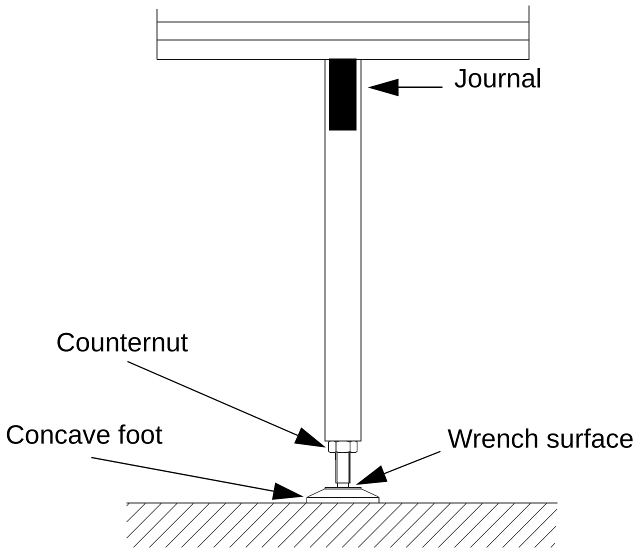
3.1. Measure the distance between the upper edge of the conveyor and the bottom.



3.2. Deduct 240 mm from the measured distance. Shorten the tube to this length at the lower end which has **no** openings for the attachment.

3.3. Drive the sealing plug into the lower end of the pedestal.

3.4. Put the tube onto the journal at the support and bolt it with the four screws.



3.5. Screw the adjusting screw to the sealing plug in such a way that the rounded end is protruding above the sealing plug with the wrench surface and the counter nut.

Mounting the standard device

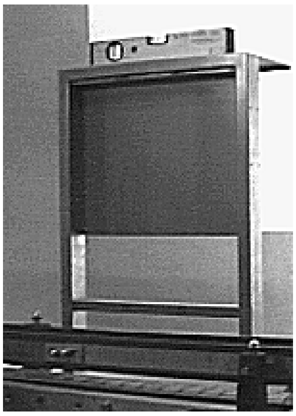
4. Attaching the standard device

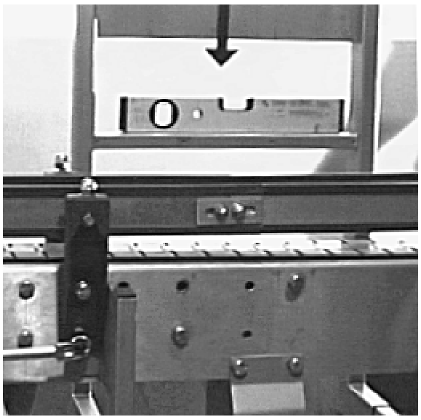
4.1. Insert the screws (M10 x 30) into the bore holes from the inside so that their heads are at the inside.

If the device is equipped with a fill level detection X-ray it is required to attach spacer blocks between the conveyor side frame and the support of the standard device on both sides. Two spacer blocks and long screws (M10 x 70) are included with the delivery for this purpose.

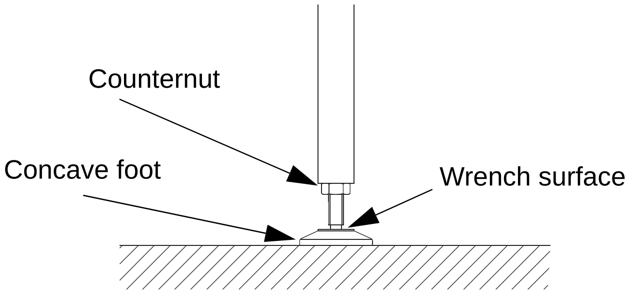
4.2. Screw the standard device to the conveyor side frame with the assistance of a colleague holding the device.

4.3. Align the complete standard device in the horizontal plane,
if necessary loosen the screw connections again and align it applying appropriate means.





4.4. Tighten all screw connections,
the attitude of the device must not shift under operating conditions.



4.5. Loosen the counter nut M16 at the adjusting screw.

4.6. Place the concave foot underneath the rounded end of the adjusting screw.

4.7. Adjust the height at the wrench surface of the adjusting screw with an open-jawed wrench SW14.

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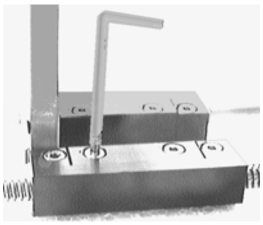
Mounting the vertical adjustment device

5. Premounting of every vertical adjustment device

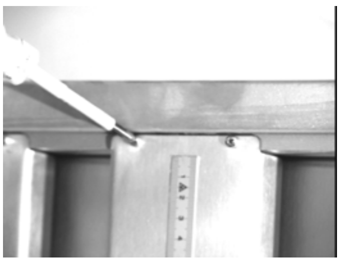
5.1. Loosen the outer hexagon socket screws above the spindle at the mounting plate a little bit,
- turn the spindle in order to remove it in upwards direction,
- take the hardware bag from the bracket,
- remove the screw from the lower end of the shaft.

When installing the third vertical adjustment device (optional) the shaft guidance and the spindle guidance on the mounting plate must be interchanged.

- For this purpose remove all hexagon socket screws,
- interchange the guidances,
- tighten the hexagon socket screws again.



5.2. Loosen the protection sheet of the vertical adjustment device at the standard device and remove it.



6. Assembly with the standard device

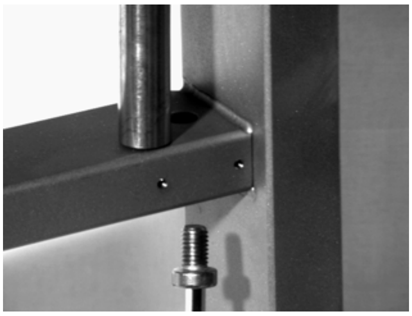
6.1. Slide the shaft into the guidance of the mounting plate so that

- the inner thread in the shaft is pointing downwards
- the borings for the measuring probe on the bracket are pointing upwards

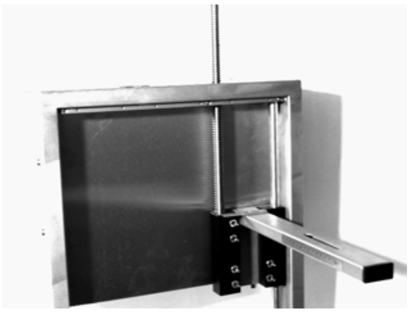
6.2. Loosen the stud screw with a hexagon socket wrench
Slide the shaft with the mounting plate from the conveyor side into the bore hole in the upper string piece which is not going upwards through the string piece,

- place the shaft end to the opposite bore hole in the lower string piece.

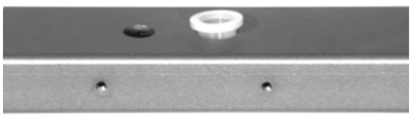
6.3. Attach the shaft from the lower side of the lower string piece with the screw in the frame and in the upper string piece sideways with the stud screw.



6.4. Remove the cover plug.
Slide the spindle with the bearing on top from above through the appropriate bore hole so that the spindle thread enters into the guidance of the mounting plate without being jammed.

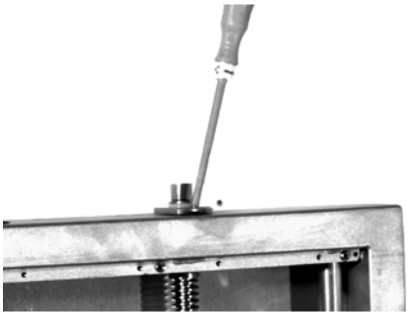


6.5. Insert the plastic bushing in the opposite bore hole of the lower string piece.



6.6. Turn the spindle so far through the guidance of the mounting plate until the end of the spindle protrudes into the plastic bush and the bearing rests on the upper string piece.

6.7. Attach the bearing to the frame with the 2 screws included in the hardware bag.

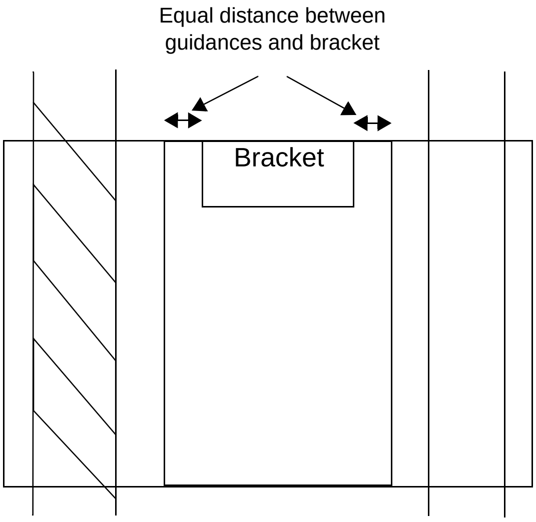


6.8. Tighten the screws in the shaft.

6.9. Centre the mounting plate with the bracket between the guidance parts so that the brackets will later on not interfere with the protection sheet.

6.10. Tighten the four inner hexagon socket screws at the mounting plate.

6.11. Tighten the four outer hexagon socket screws at the mounting plate to such an extent that
the shaft and the threaded spindle can just easily move.



7. Function check of the vertical adjustment device

7.1. Move the bracket of the vertical adjustment device once and in full length upwards and downwards

- check for easy movement and eliminate deficiencies.

8. Additional vertical adjustment devices

The procedure is the same.

9. Mounting of display elements

9.1. Detach the measuring probe from the bracket.

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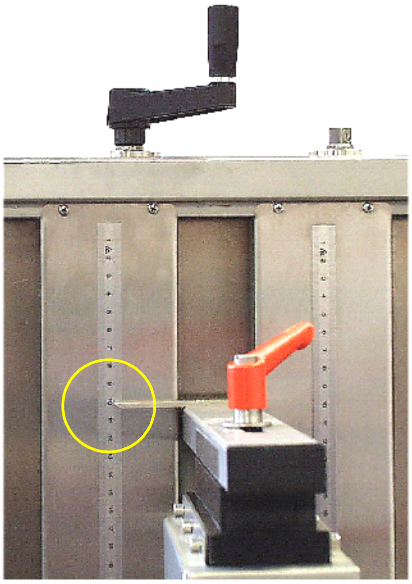
9.2. Reinsert the protection sheets of the vertical adjustment devices and attach them with screws so that there is a spacing between the protection sheet and the bracket,

- align the scale.

9.3. Install the measuring probe to the bracket in such a way that it is

- * pointing towards the scale
- not touching the protection sheet.



Mounting of measuring bridges for detection modules

General

The three measuring bridges (maximum number) are installed at the brackets of the vertical adjustment devices in the order of their function. The number of measuring bridges is dependent on the device function. One measuring bridge with a minimum of one photocell is included in the standard scope of delivery. The individual measuring bridges are prefabricated and equipped with additional sensors according to the required detection type (⇒ Detection modules, page 51).

Order of measuring bridges in moving direction

	Full container checks	**Laning/Fluid**
1st bracket	Measuring bridge with the main trigger and the closure detection (optional)	Measuring bridge with the main trigger
2nd bracket	Measuring bridge for fill level detection (optional)	Measuring bridge for the closure detection (optional)
3rd bracket	Measuring bridge for label detection (optional) or 2nd fill level detection Gamma (optional), X-ray (optional) or infrared (optional)	Measuring bridge for the residual liquid detection Gamma (optional)

The number of available supports depends on the options delivered to a customer.

The sensors for the residual liquid detection HF are directly attached to the conveyor guide rails.

Do not carry out mounting unless the conveyor is stopped!

In case of the measuring bridges for the closure detections optical, pressure and foil, the sensors must check a container after it has passed the main trigger. That means that the sensors must be installed in moving direction after the trigger. In case of the prefabricated measuring bridges for closure detection modules, this condition must be checked at the mounting location. If required, the sensors can be mounted without any problems on the opposite side of the measuring bridge according to the disassembly instructions.

It is prohibited to operate the Gamma and X-ray fill level detections or the Gamma residual liquid detection without approval or without the protection devices!

Components of the measuring bridge

The delivered measuring bridges are separately packaged and carry an exterior designation. The different measuring bridges are completely prefabricated and include the horizontal adjustment devices (residual liquid detection HF without horizontal adjustment).
Depending on the options a maximum of three measuring bridges will be delivered.

An orange/green warning light (in Great-Britain: red/green) and two shutter switches will be delivered with a measuring bridge for a fill level detection Gamma or X-ray or a residual liquid detection Gamma. The warning light must be mounted to the frame of the standard device at the prepared bore holes, the switches to the right and left side of the conveyor. The orange warning light indicates that the radiation window is open. It can be closed with the switches at any time and independently of the device.

The KT variant of the HF fill level measuring bridge includes an earthing cable. This cable must be connected separately to the metal body of the conveyor.

Mounting the measuring bridge

Section 3 is applicable for the HF residual liquid detection, the sections 1 and 2 are applicable for all other measuring bridges.

Switch off the conveyor and secure it so that it cannot be switched on again!
Remove the containers from the conveyor in the mounting area.

1. Detaching the clamping lever

1.1. Unscrew the orange clamping lever from the measuring bridge.

1.2. Remove the washer and put it onto the threaded part of the clamping lever.

2. Mounting the measuring bridge to the support

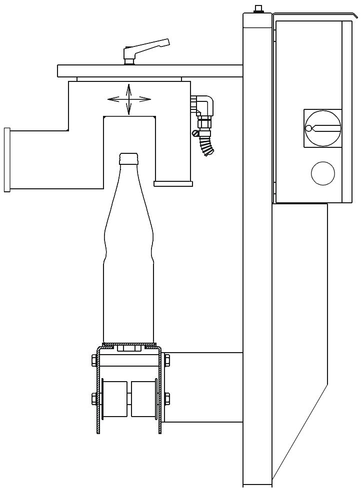
2.1. Insert the clamping lever with the washer into the opening of the support from above.

2.2. Hold the measuring bridge to the support from below so that:

- the connection cable is pointing towards the standard device,
- the plate of the measuring bridge is in contact with the lower side of the support and
- the thread of the clamping lever engages in the inside thread.

2.3. Attach the measuring bridge loosely by turning the clamping lever.

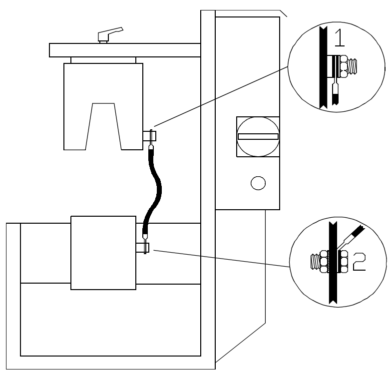
2.4. Align the measuring bridge to the centre of the conveyor and tighten the clamping lever.



Additional measuring bridges

The procedure is the same.

In case of the KT variant of the measuring bridge for the HF fill level detection, the earthing cable must be connected to the conveyor
⇒ HF measuring bridge (optional), page 194.



3. Mounting the residual liquid detection HF (optional)

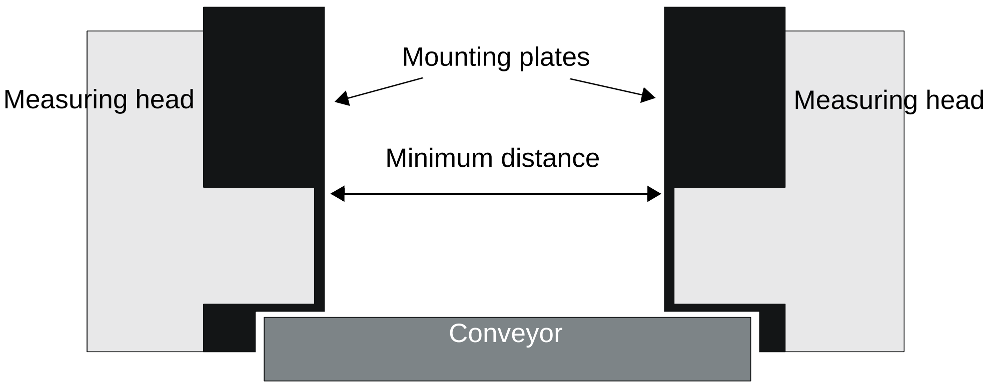
The HF residual liquid detection must be integrated in a section of the conveyor guide rails. For this purpose a part of sufficient size must be removed from both sides of the conveyor guide rails. During their manufacturing the emitter and receiver measuring heads have been provided with mounting and protection plates appropriate for the mounting in existing guide rails. As the final mechanical attachment is always dependent on local conditions, an individual adaptation to the existing guide rails is required. In case of installations which produce various brands, the guide rails must allow for horizontal adjustments.

3.1. The emitter and receiver measuring heads must be mounted opposite to each other. To do so remove a part with a length of at least 20 cm from both sides of the guide rails (length of the mounting plate is 20 cm).

3.2. Integrate both mounting plates in the guide rails. For this purpose drill four threaded bore holes in every mounting plate. The screws required for mounting are attached to the module.

Transmitter measuring head of HF residual liquid detection with mounting plate

3.3. Mount the measuring heads as low as possible above the conveyor surface (⇒ illustration below). This kind of mounting results in a minimum distance between the mounting plates.



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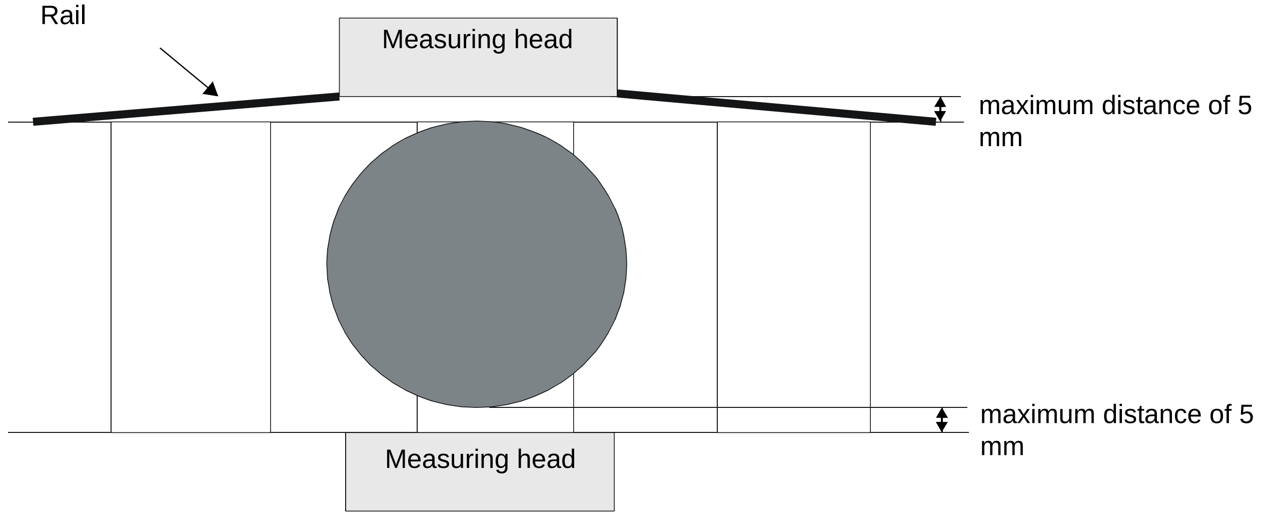
3.4. When, in installations which produce variable brands, containers with a base diameter equal to or wider than the minimum distance between the mounting plates are to be checked, the guide rails must allow for horizontal adjustment. The lateral distance of containers to the measuring heads must not exceed a maximum of 5 mm.

The passing containers must not be stopped by protruding edges or slowed down by contact with the guide rails to such an extent that they position slip on the conveyor.



Mounting of the Gamma and X-ray warning light (optional)

4. Mounting preparations

Mount the warning light to the frame of the control unit. The mounting position right or left of the control unit is dependent on the position of the measuring bridge. Mount the warning light on the side that is closest to the measuring bridge.

4.1. Remove the two recessed head screws from the outer frame of the control unit at the side chosen for mounting. The recessed head screws are not required for the mounting of the warning light.

5. Mounting the warning light

5.1. Take the hexagon socket screws from the hardware bag attached to the warning light, insert them through the bore holes of the warning light support and attach the warning light in such a way that it is well visible above the device.

5.2. Put the black caps included in the hardware bag over the hexagon socket screws.

Mounting the shutter switches (optional)

6. Selection of the mounting location

The shutter switches must be mounted according to the specific regulations of a country.
The following is applicable for Germany:

- on both sides of the conveyor belt
- near the Gamma or X-ray measuring bridge
- unobstructed access
- no obstruction of moving parts within or at the conveyor

7. Mounting the shutter switches at the conveyor

Switch used in Germany

Switch used outside Germany

7.1. Open the switch cover.

7.2. Take the bag with the screws for assembly.

7.3. Put the switch to the conveyor at the chosen mounting location and mark the bore holes.

7.4. Drill the holes into the conveyor.

7.5. Screw the switch to the conveyor by using the screws required for the mounting (7.2).

7.6. Close the switch.

7.7. Same procedure for mounting the second switch.

Mounting of peripheral devices

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Mounting the encoder

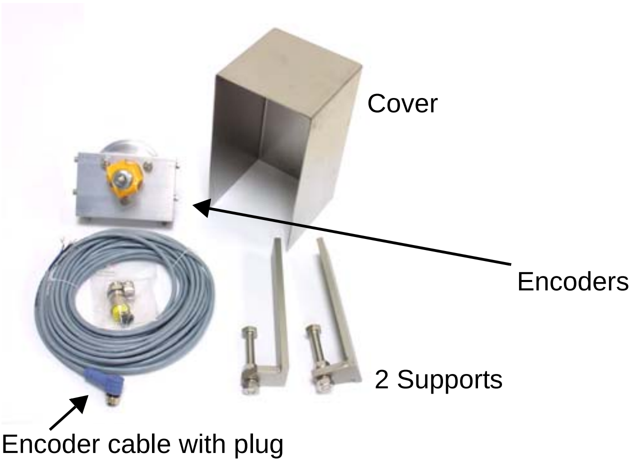
A rotating pulse generator which generates a defined number of angular pulses per rotation of the drive shaft is used as clock source. By the direct linking of the encoder shaft and the drive shaft of the conveyor chain wheel, one rotation of the chain wheel always corresponds to the same number of angular pulses. A rotation of the chain wheel also corresponds to a defined distance the conveyor has moved. This interaction allows the container tracking on the conveyor after a defined position on the conveyor has been allocated for one time.

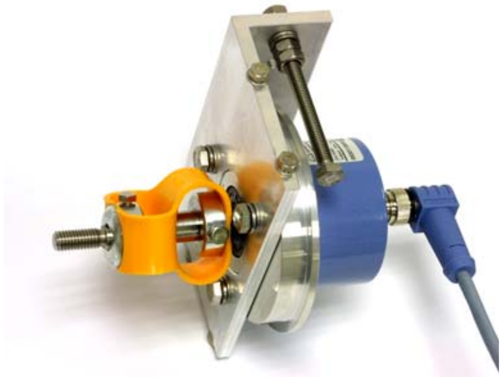
Do not carry out mounting unless the conveyor is stopped!

When mounting the encoder, pay attention that it is connected to the drive shaft of the conveyor where the device and the rejector are mounted.

The following parts belong to the encoder, they must be available for mounting.

Parts of the encoder




Encoder with connected cable

The following pages explain the steps for encoder mounting in the appropriate order.

Procedures will only be given in exceptional cases because it is assumed that specialists will carry out the mounting.

1. Preparation of the drive shaft

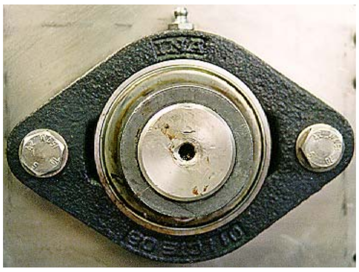
⚠ Switch off the conveyor and secure it so that it cannot be switched on again!
Remove the containers from the conveyor in the mounting area.

1.1. Determine the conveyor drive shaft to be used.

1.2. Centre drive shaft and mark it with the prick punch.

1.3. Drill a centred bore hole and remove burrs
(7 mm drill, 20 mm deep).

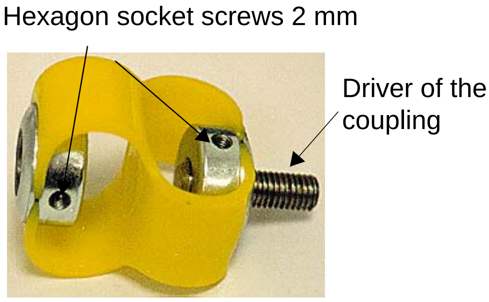
1.4. Cut 15 mm deep thread M8 in the bore hole.

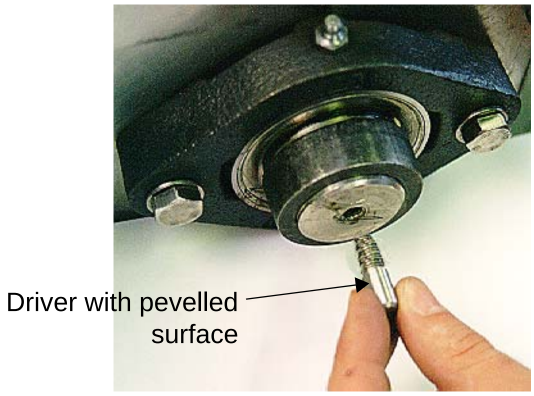


2. Coupling attachment

2.1. Unscrew the coupling from the encoder.

2.2. Detach the coupling from the driver.



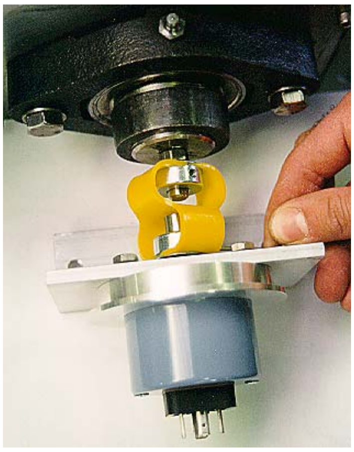


2.3. Screw the driver in the M8 thread of the drive shaft,
- secure with screw retention agent.

2.4. Place the coupling onto the driver,
- on the outside, the beginning of the thread is flush with the coupling,
- the hexagon socket screw presses flat against the bevelled surface of the driver.

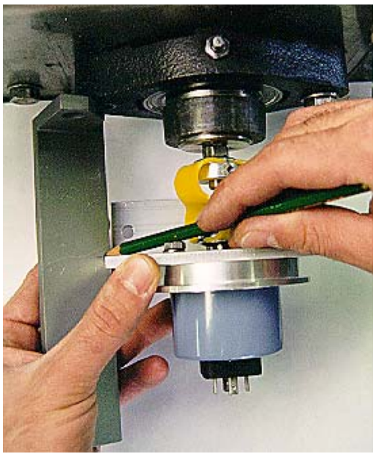
3. Attaching the holder

3.1. Slide the encoder shaft into the coupling,
- on the inside the encoder shaft is flush with the coupling,
- the hexagon socket screw is pointing into the groove of the encoder shaft.

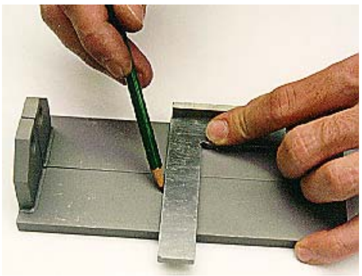


3.2. Loosen the left attachment screw of the drive bearing (possibly flange bearing) from the drive shaft.

3.3. Hold the support horizontally to the bearing and
- draw the distance until the attachment elbow,



- transpose it to the second support and shorten it accordingly.



3.4. Mount the support horizontally to the bearing by using the screw loosened in step 3.2.
- (it may be possible that a longer screw is required, not included with delivered parts).

3.5. Tighten the attachment screw again.

Dependent on local conditions, the encoder supports can also be installed in a different manner.

3.6. Attach the support at the right with the right attachment screw (as described from 3.4. to 3.5.).

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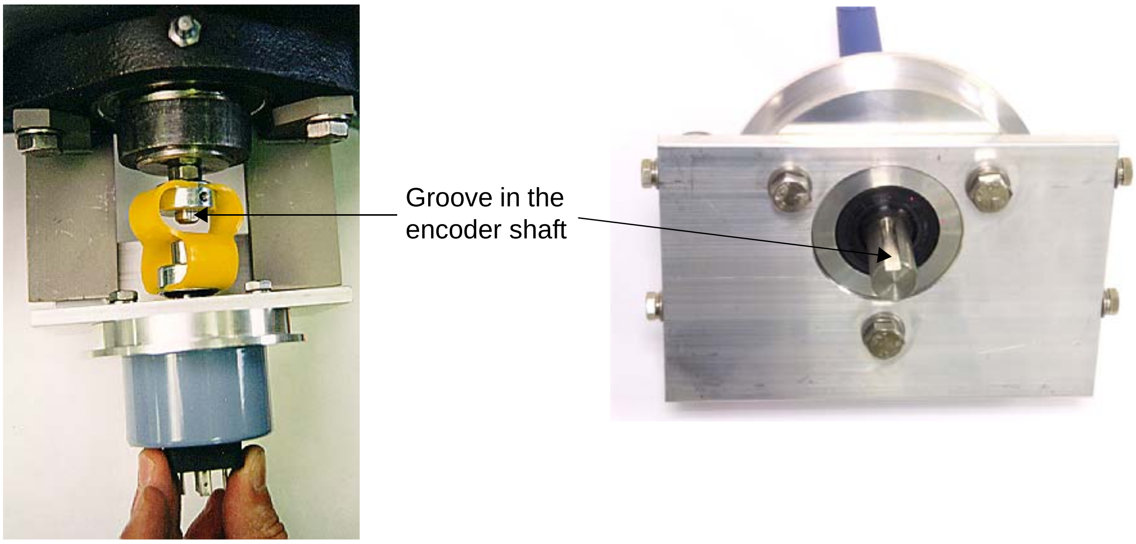
4. Drilling of the supports

4.1. Hold the encoder with the attachment elbows to the supports.

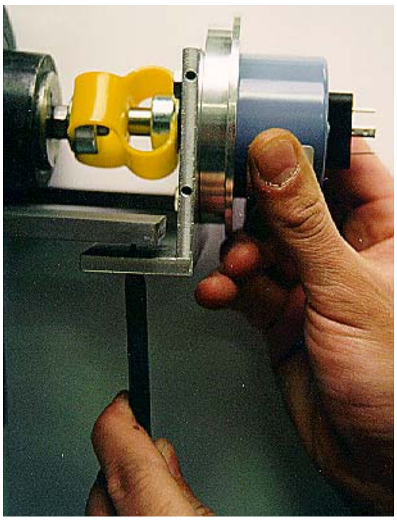
4.2. Slide the encoder shaft into the coupling,
- on the inside the encoder shaft is flush with the coupling,
- the hexagon socket screw is pointing into the groove of the encoder shaft.



4.3. Transpose the bore hole positions of the attachment elbows to the supports.

4.4. Remove the encoder.

4.5. At the markings drill holes of 6,5 mm and remove burrs.



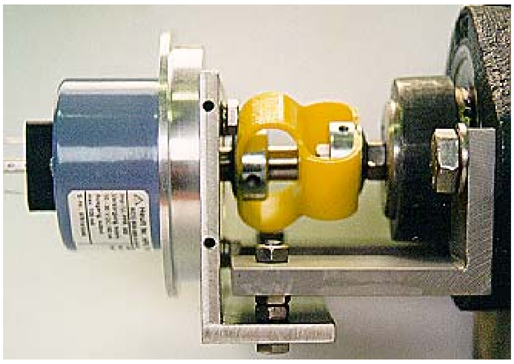
4.6. Attach the encoder to the supports with screws

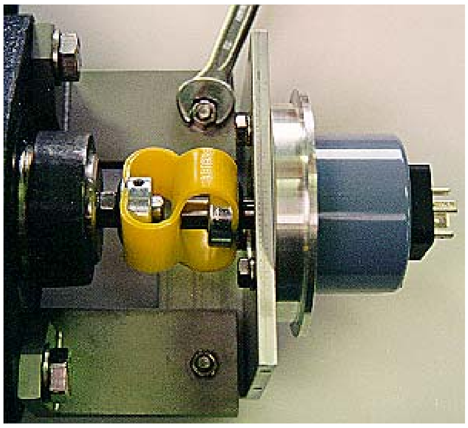
- each time with screw M6 x 75 mm, nut, counter nut and spring washer.

The drive shafts of encoder and conveyor must be aligned.
Height differences due to local conditions must be compensated for by additional washers or spacers.

When the drive shafts of encoder and conveyor are not correctly aligned, the unbalanced mass at the encoder shaft will cause the destruction of the encoder.

4.7. Place the encoder as in step 4.2. and attach the coupling with the screw (hexagon socket 2 mm).





4.8. Check for unbalanced mass and, if applicable, eliminate it as described in step 4.6.,

- for this purpose move the conveyor and visually check the encoder whether it runs untrue.

4.9. Shorten the protruding ends of the screws.

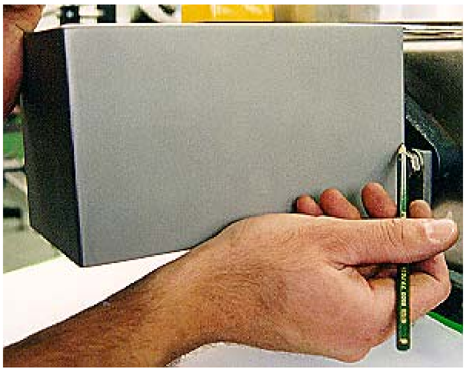
5. Mounting of the cover

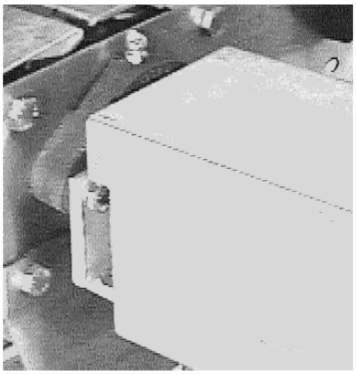
5.1. Place the cover over the mounted encoder assembly,

- as close as possible to the conveyor and resting on the encoder.

Depending on local conditions an adaptation may be required to close the encoder assembly as best as possible with the cover and that there is no danger caused by rotating parts.

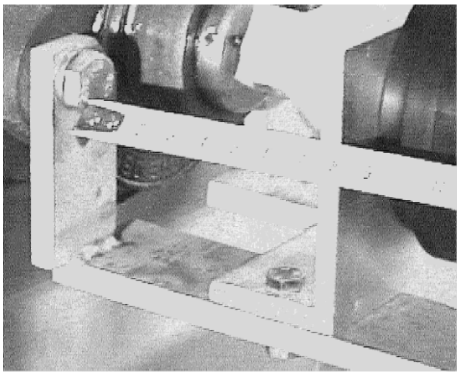
This example shows the clipping of the cover to match this requirement.

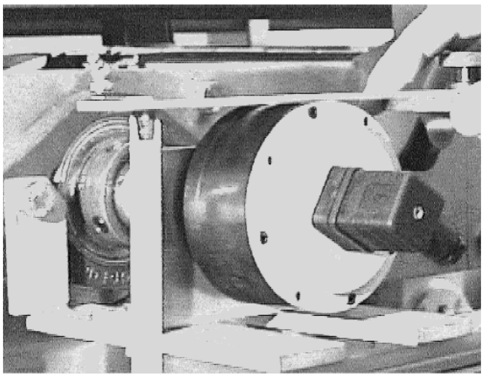




5.2. Attachment of the cover in the attachment elbows of the encoder,

- overtake the bore holes in the attachment elbow of the encoder, mark the positions of the attachment screws on the cover, two attachment points for every side are required.





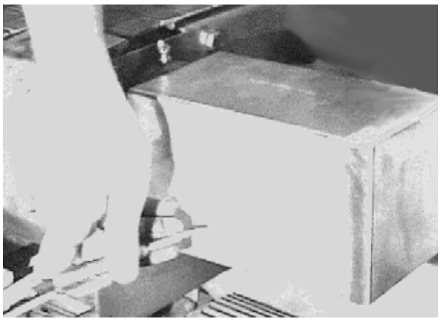
Take the measures of the assembly completed so far,
the 1st bore hole in the attachment elbow on every side is 10 mm away from the upper edge, the second one 50 mm.
It is possible that there are no bore holes in the attachment elbow or that the assembly does not fit. In this case proceed as described in 5.4.

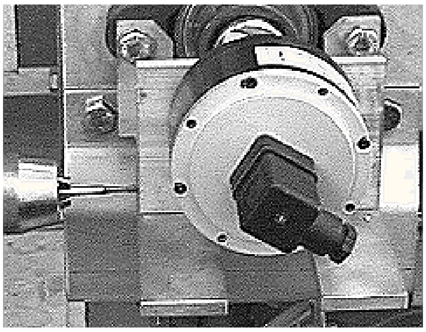
5.3. Drill bore holes of 5 mm in the cover.

When the attachment elbows are already provided with threads, continue mounting with step 5.7.

5.4. Mark the bore holes of the cover on the attachment elbow of the encoder.

5.5. Drill 4 x 3.2 mm holes, 15 mm deep into the attachment elbow.

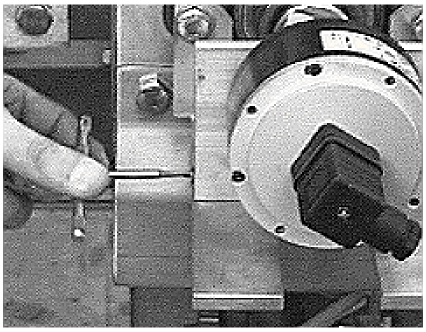


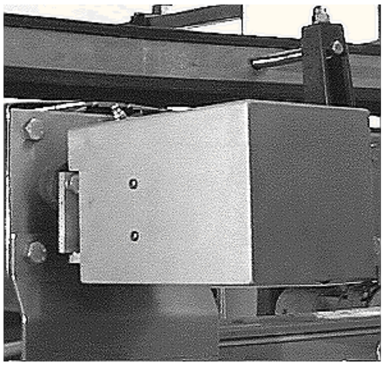


5.6. Cut 10 mm deep threads M4 into the bore holes.

5.7. Connect the power supply cable again to the encoder if it was removed.

5.8. Attach the cover with M4 screws.





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Mounting the additional trigger / reject verification (optional)

The optional **additional trigger** is required when the distance between the device and the rejector is greater than 2000 mm or when the repositioning of containers is required between a machine and the device. The trigger measuring bridge is prefabricated so that only the flange clamping device must be installed to the conveyor.

The optional measuring bridge for the **reject verification trigger** is mounted to the conveyor immediately after the rejector. The trigger measuring bridge is prefabricated so that only the flange clamping device must be installed to the conveyor.

Mounting is only permitted when the conveyor is stopped!
Remove the containers from the conveyor in the mounting area.

When attaching the holding elbow to the conveyor, the mounted parts should not block or damage moving parts within or at the conveyor.

Parts of the additional trigger and the reject verification trigger

Complete trigger measuring bridge with holding elbow

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Selection of the mounting location

Switch off the conveyor and secure it so that it cannot be switched on again!
Remove containers from the conveyor in the mounting area.

Only use the supplied screws for attachment to the conveyor side frame. Too long screws might hamper the conveyor chain.

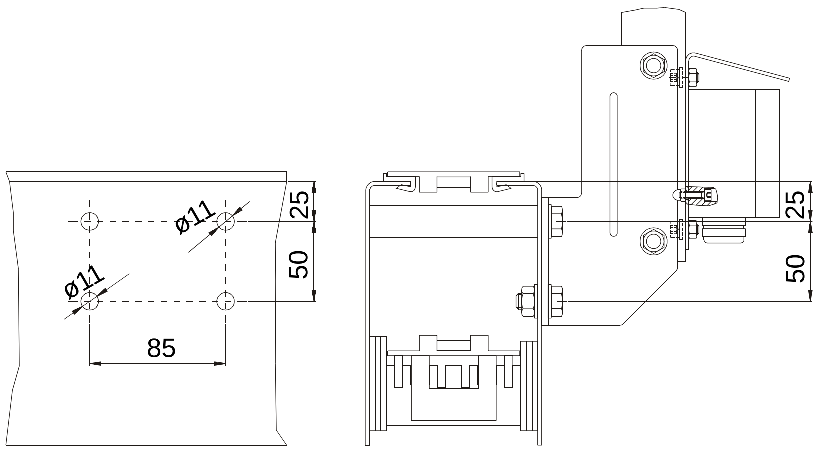
Mounting the trigger measuring bridge

1. Additional trigger

Determine the attachment point of the holding elbow on the conveyor side frame,
the two upper bore holes must be made 25 mm below the upper edge of the conveyor side frame (⇒ drill plan). If a distance bolt is located in the attachment area, its bore hole may be used for attachment.

In the case of an additional trigger between device and rejector:

- the distance of the additional trigger to the rejector must be between 350 mm and 200 mm,
- there must be no conveyor transition between the device and the rejector.



Drill plan and assembly drawing

1. Reject verification

Determine the attachment point of the holding elbow on the conveyor side frame,

- so that the holding elbow is located at a distance of 100 mm to 200 mm after the rejector
- at the conveyor that transports the good containers,
- without a conveyor transition,
- the two upper bore holes must be made 25 mm below the upper edge of the conveyor side
- frame (⇒ drill plan). If a distance bolt is located in the attachment area,
- its bore hole may be used for attachment.

2. Mark the attachment holes on the conveyor side frame according to the drill plan.

3. At the markings drill holes of 11 mm.

4. Mount the trigger measuring bridge with M10 screws and nuts at the conveyor side frame (⇒ assembly drawing).

We do not recommend other attachment methods with bolts, rivets or glue to permit later dismounting.

Mounting of the warning light (optional)

The optional warning light for the status display is installed at the conveyor near the device. The warning light is prefabricated so that only the flange clamping device must be installed at the conveyor.

Mounting is only permitted when the conveyor is stopped!
Remove the containers from the conveyor in the mounting area.

STOP

When attaching the flange clamping piece to the conveyor, the mounted parts should not block or damage moving conveyor parts.

Parts of the warning light

Prefabricated warning light with power supply cable,
Flanged clamping joint with screws

Selection of the mounting location

Switch off the conveyor and secure it so that it cannot be switched on again!
Remove containers from the conveyor in the mounting area.

The warning light has a standard power supply cable of 1.5 m.
When selecting the mounting location pay attention that the warning light is not too far away from the device and that it is well visible.

Too long attachment screws pointing to the inside of the conveyor side frame may hamper the conveyor chain. Insert all the bolts so that the heads are on the inside of the conveyor side frame.

1. Mounting the flange clamping piece

1.1. Determine the attachment position of the flange clamping piece on the conveyor side frame,
- distance to the device about 500 mm,
- determine the height and the distance so that the attachment does not cause an obstruction for other parts.

1.2. Place the flange clamping piece to the conveyor side frame and mark the position,
- the squared opening from top to bottom,
- align it horizontally and in parallel,
- mark the attachment holes on the conveyor side frame.

1.3. At the markings drill holes of 9 mm.

1.4. Mount the flange clamping piece with M8 screw connections,
- insert the screws so that the heads are located at the inside of the conveyor side frame.

We do not recommend other attachment methods with bolts, rivets or glue to permit later dismounting.

2. Attachment of the warning light

2.1. Insert the warning light with the supply cable pointing downwards in the opening of the profile,
- adjust it as high as possible but with a safe rest in the flange.

2.2. Tighten the warning light with screws.

Laning, jam detector (optional)

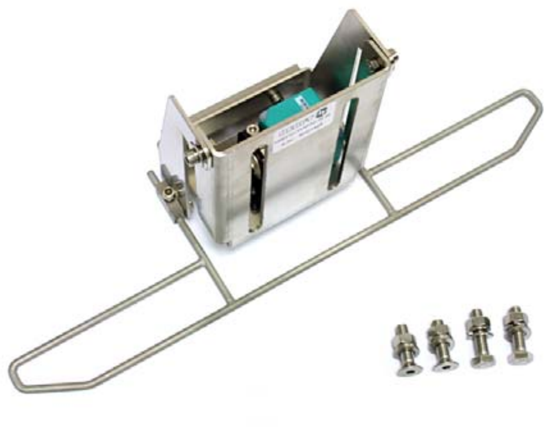
Mounting is only permitted when the conveyor is stopped!
Remove the containers from the conveyor in the mounting area.

STOP

When attaching the flange clamping piece to the conveyor, the mounted parts should not block or damage moving conveyor parts.

Parts of a jam detector

Assembled jam detector with bow,
Bolts



Selection of mounting locations

Switch off the conveyor and secure it so that it cannot be switched on again!
Remove containers from the conveyor in the mounting area.

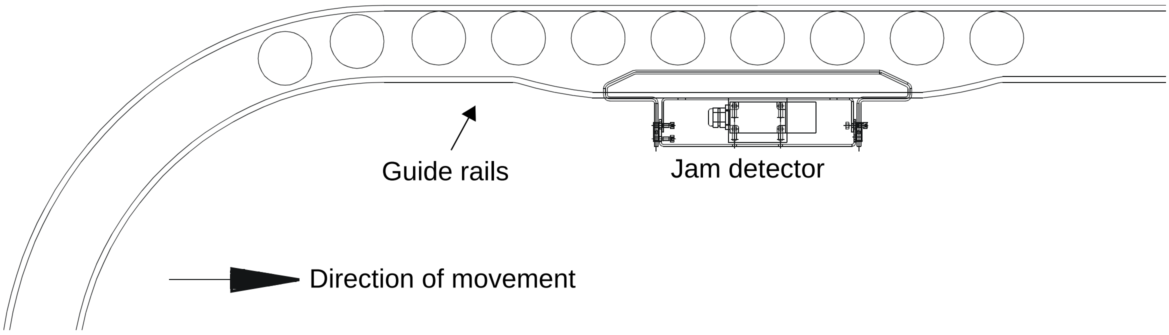
Fastening bolts on the conveyor side frame which are too long and turned inwards can block the conveyor chain. Insert all the bolts so that the heads are on the inside of the conveyor side frame.

The jam detectors have been designed for the detection of container jams on the exit conveyors. In order to allow for sufficient reaction time by the control program and to avoid disturbances at a rejector, the jam detectors must be mounted at a defined distance from a rejector. The distance is dependent on the production capacity of an installation but should be at least 1 m.

Mounting preparations

A jam detector must be mounted so that its bow protrudes into the flow of containers between the guide rails and the conveyor surface. Adjust the guide rails so that the normal container flow (no jam) will not touch the bow.

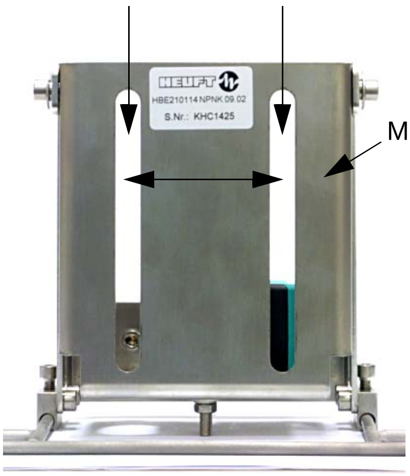
Jammed containers which deviate immediately sideways must touch the bow. The pressure moves the bow so far that the sensor installed within the jam detector is able to detect the bow movement.



1. Drilling of attachment holes

A jam detector must be attached to the conveyor guide rails with two M8 screws.

1.1. Mark two bore holes at the guide rails. Use the oblong holes of the jam detector mounting plate as template. The position of the bore holes must ensure that the bow is approximately 10 to 15 mm above the conveyor.



1.2. Drill two holes with a diameter of 9 mm in the guide rails.

2. Mounting of a jam detector

2.1. Insert both screws from the inside through the guide rails and the mounting plate so that the screw heads are inside the guide rails.

2.2. Put washers over the screws.

2.3. Attach the nuts loosely so that the jam detector can be moved up and down.

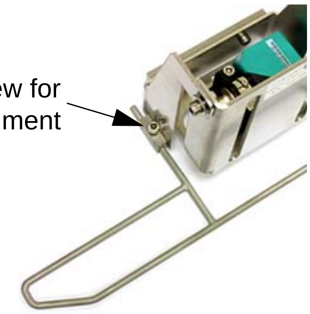
2.4. Adjust the jam detector so far up or down that the bow is 10 to 15 mm above the conveyor.

2.5. Tighten both nuts.

3. Adjustment of the bow position

The bow is attached to the jam detector on both sides. When the bow does not protrude into the flow of containers by 20 mm, adjust the distance of the bow at the jam detector.

3.1. Loosen both hexagon socket screws.



3.2. Shift the bow so far that the distance to the guide rails is 20 mm.

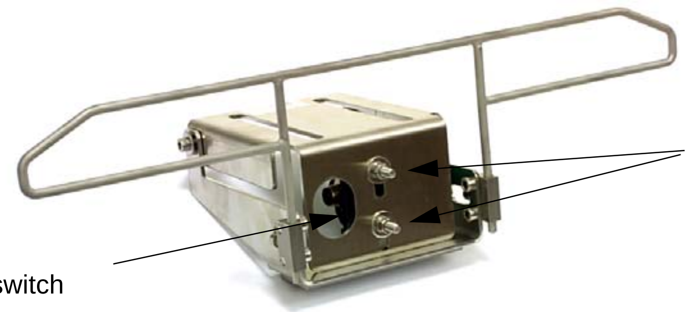
Shift the bow only to an extent which still ensures its secure attachment with screws.

3.3. Tighten both hexagon socket screws.

4. Shifting of the proximity switch

Shift the proximity switch only if a distance of 20 mm between the guide rails and the bow **cannot** be achieved with procedure "3. Adjustment of the bow position".

If the guide rails are of such a volume that the distance remains smaller than 20 mm when using the above procedure, the correct distance can be achieved by shifting the proximity switch:



4.1. Loosen the attachment nuts of the proximity switch.

4.2. Shift the proximity switch towards the mounting sheet within the range of the oblong holes.

4.3. Tighten the attachment nuts of the proximity switch.

4.4. Measure the distance between the guide rails and the bow.

4.5. If the distance between the guide rails and the bow is not 20 mm, adjust the distance
⇒ Adjustment of the bow position, page 122

Assembling the rejector

RB *basic* V8.00

General

The rejectors are prefabricated and will be installed to the conveyor on location. The rejection area is dependent on the selected rejector option and the corresponding container transport.

Do not carry out mounting unless the conveyor is stopped!

If the type of a conveyor deviates from those shown in the illustrations, this fact does normally not influence the described attachment procedures.

When mounting the rejector to the conveyor it must be assured that moving parts (e.g. chain holders, deflection pulleys, etc.) are not jammed or damaged.

Supply lines installed within and at the conveyor side frame such as cables or lubrication lines must be placed so that they do not hamper the rejector function.

Only in case of a **signal acceptance on the conveyor** the distance between the detection and the rejection position must be at least 400 mm. In case of a signal delay the distance must be at least 500 mm!

The rejector must always be mounted to a horizontal conveyor without crossovers, curves or protruding edges, and the rejector itself must be level. The device and the rejector are attached to the conveyor.

Fastening bolts on the conveyor side frame which are too long and turned inwards can block the conveyor chain. All screw heads should point inwards i.e. towards the moving parts.

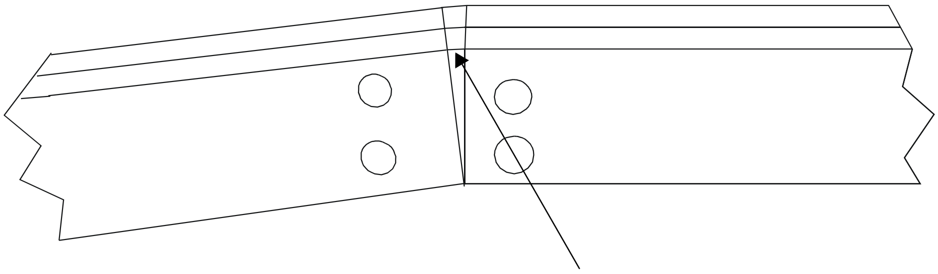
Notes regarding a mechanically reliable rejection

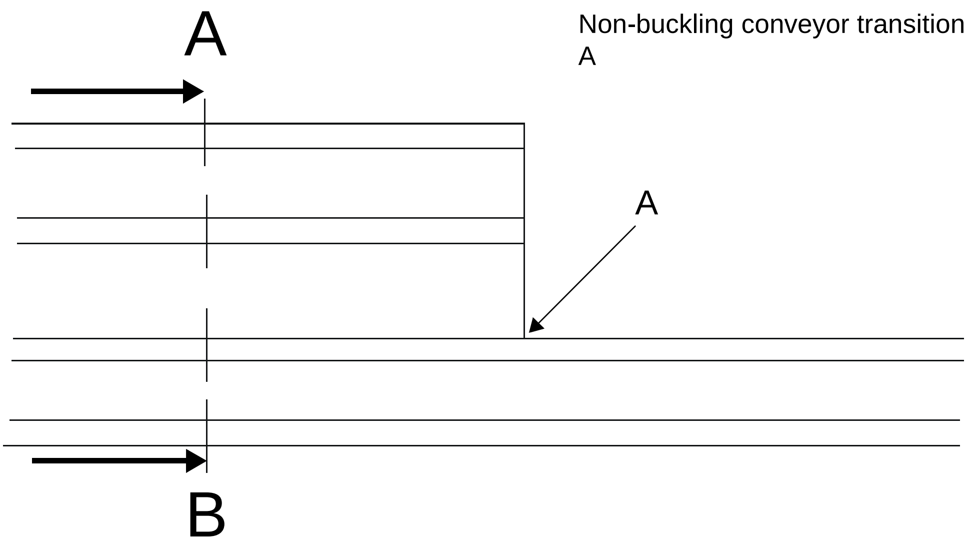
The rejector segments shift the containers from the conveyor to another conveyor or into a waste container. The movement pattern of the containers must by no means be disturbed. Disturbing factors may be:

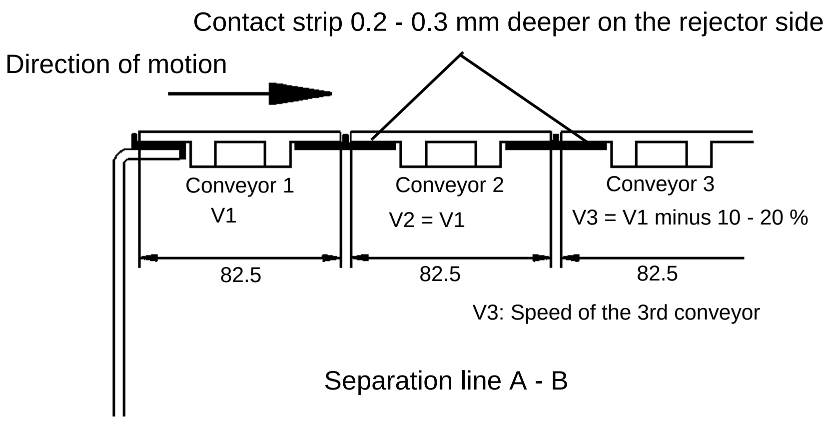
- blunt conveyor surfaces
- separation ridges between the conveyor chains which are too high
- a defective chain link
- insufficient conveyor lubrication
- different speeds of the individual chains

The rejector segments touch the containers to be rejected and form an extension of the guide rails. During the rejection process the container must remain stable; it must not tumble or take an inclined position. The stability is determined essentially by the guide rails, the conveyor speed, the conveyor control and the point of impact of the segment.

Alignment of the conveyors







In order to obtain a reliable rejection of faulty containers the available conveyors are mounted gradually. Therefore, the conveyors are aligned by 1.4° downgrade between the first and the last conveyor.

The conveyor crossovers in the rejection area must be absolutely even; the second conveyor chain and the middle ridge of the wear strip must not have any protruding edges.

mono, ***pusher*** **and** ***flip***

These three rejector types are mainly designed for the rejection into a waste container. The mounting of the rejectors must be carried out so that container disposal is possible and that all rejected containers fall into the waste container.

mono

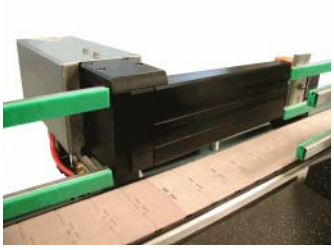
This rejector is equipped with an approach wedge installed prior to the segment as seen in moving direction. The containers approach the rejector alongside the guide rails on the side of the rejector. The transition from the guide rails to the wedge is fluent so that no additional container movement (rotation or skidding) is caused. Alongside the approach section the containers move towards the rejection segment.

pusher

The rejector segment of the *pusher* ends flush with the conveyor. The *pusher* does not require an approach section by guide rails.

flip

The rejector segment of the *flip* ends flush with the conveyor. The rejection requires an approach section by guide rails



mono

pusher

flip

DELTA-FW **and** ***DELTA-K***

The rejectors *DELTA-FW* and *DELTA-K* reject containers in upright position from the flow of production containers to a parallel conveyor. Both conveyors must operate at synchronised speeds. Therefore, it is recommended to drive both conveyors with the same motor.
A container to be rejected must always approach the first segment but must have a soft impact. In order to fulfil this requirement, the containers approach along the guide rails on the rejector side. The guide rails must be adjusted correspondingly so that the containers do not slide about on the conveyor chain. When changing to another container type, the guide rail adjustment at the rejector must not be changed. The guide rails on the opposite side must be adjustable.
The separator installed after the *DELTA-FW* or *DELTA-K* prevents that the rejected containers are forced back from the parallel conveyor or the collection table into the flow of good containers.

Bottom photocell

The standard equipment of the *DELTA-FW* rejector includes the bottom photocell, it is optional for the *DELTA-K* rejector. The bottom photocell of the *DELTA-FW* rejector detects containers which are lying on the conveyor and glass fragments in gaps between containers. The bottom photocell of the *DELTA-K* rejector detects containers with a broken neck, too low containers and foreign objects that reach up to the height of the extended segments. The detected faulty containers and foreign objects will be rejected.

For a safe detection of objects lying on the conveyor the bottom photocell of the *DELTA-FW* rejector must be mounted so that it checks the container flow immediately above the conveyor surface. The bottom photocell of the *DELTA-K* rejector is mounted at the height of the lower edge of the extended segments. The casing of both bottom photocells include a transmitter and a receiver photocell. The bottom photocell is attached on the frame of the standard device in the bore holes provided for this purpose. The corresponding reflection mirror is installed on the opposite conveyor side.

When there is no object in the gap between two containers, the optical path of the bottom photocell is free in the gap area. Objects on the conveyor will interrupt the optical path.

Variable heights of the chain links must not interrupt the light beam!
Adjust the guide rails so that they do not interrupt the light beam!

Guide rails

The guide rails must be continuous from the last trigger of the device to the (first) rejector segment or to the approach wedge. The guide rails must not have edges, e.g. moulds on plastic strips or protruding attachment screws.

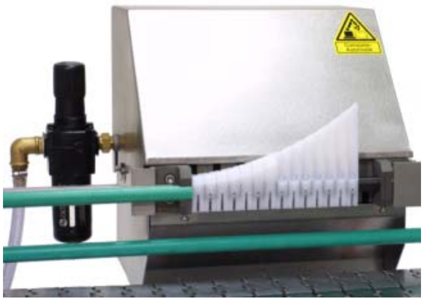
The adjustment of the guide rails on both conveyor sides must be in such a way that rejected containers are reliably guided into the waste container or onto the collection table.

Contact protection device

The protection device either made of plexiglass or, in case of rejections into a waste container, as deflector is mounted opposite to the rejector segments and is designed to prevent the throwing of containers or inadvertent touching of the rejection area.
It is absolutely necessary to mount the protection device.

Operation of the *DELTA-FW* rejector without the protection device is prohibited!

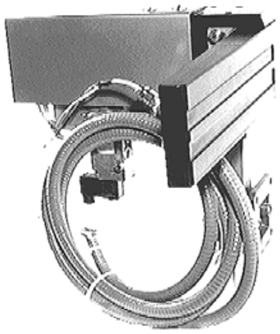
***DELTA-FW* rejector with protection device**



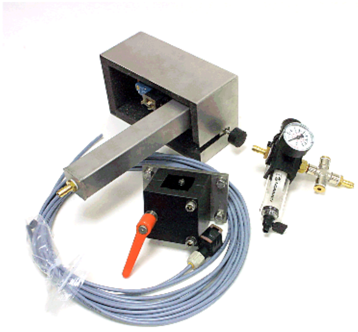
***DELTA-K* rejector**

Parts of the optional rejectors

mono	*mono* rejector with flange clamping piece, contact protection device, hardware bag
pusher	*pusher* rejector with flange clamping piece, contact protection device, hardware bag
flip	*flip* rejector with flange clamping piece, compressed-air unit, hardware bag



mono



pusher

flip

DELTA-FW	*DELTA-FW* rejector , 2 rejector supports, pedestal bottom photocell with support and reflecting mirror, contact protection device, rejection wedge with rectangular profile, hardware bag
DELTA-K	*DELTA-K* rejector , tripod stand, contact protection device, rejection wedge with rectangular profile, guide rails hardware bag, optional: bottom photocell with support and reflecting mirror

Bottom photocell with support and reflecting mirror

Preparations

All the rejectors must be installed at the conveyor which belongs to the control area of the device. The containers leave this area with the rejection to another conveyor or into a waste container.
The minimum distance from the device to the (first) rejector segment is 200 mm, measured from the last detection module. As last detection module is considered the one most distant from the main trigger seen in moving direction; in general this is the bottom photocell in the case of the *DELTA-FW* (*DELTA-K* optional) and the last measuring bridge in the case of the rejectors *DELTA-K*, *mono*, *pusher* and *flip*. **Only** in the case of a **signal acceptance at the conveyor** the distance between the detection and the rejection position must be at least 400 mm. In case of a signal delay the distance must be at least 500 mm! The distance to the rejector segment must not exceed 2000 mm. When local conditions require greater distances, an additional trigger must be mounted in a range of 350 mm to 200 mm prior the rejector.

In the rejection area the conveyor must assure a gentle and level container transport.
Prior to mounting the rejector the pressurised air supply (with a flexible hose of 0.5 inch) must be assured.

Selection of the mounting location

⚠ Switch off the conveyor and secure it so that it cannot be switched on again!
Remove the containers from the conveyor in the mounting area.

1. Horizontal conveyor section
    - conveyor section without transitions, curves, steps,
    - Approach side of containers on the guide rails corresponds to rejector side.

2. Dismount the guide rails for the area where the rejector is to be mounted

Mounting the *DELTA-FW* (optional)

1. Mounting the bottom photocell of the *DELTA-FW*

1.1. Remove the black covers, seen in moving direction, they are located on the outside of the frame at the exit side of the device.

1.2. Attach the preassembled square profile support with the bottom photocell,
- transmitter and receiver are visible in the window of the support,
- the window is pointing towards the conveyor,
- the connection cable is pointing downwards,
- attach in the bore holes with two M4 screws.

1.3. Attach the preassembled reflecting mirror to the bow of the device,
- parallel to the photocell on the opposite conveyor side,
- the reflector surface is pointing towards the photocell,
- attach in the prepared bore holes of the bow with M6 screws.

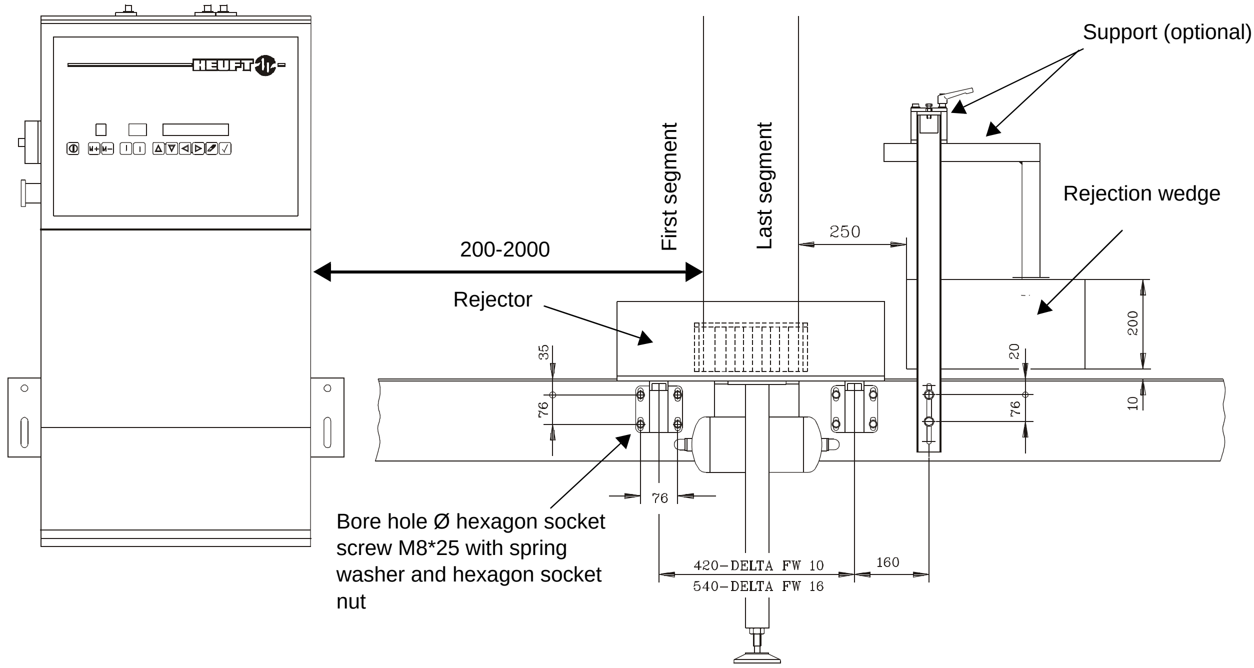
RB *basic* V8.00

1.4. If required adjust the height of the bottom photocell,
- loosen the photocell in its support,
- shift it until the switching function is assured (about 10 mm above the conveyor),
- tighten the photocell again in its support.

Variable heights of the chain links must not interrupt the light beam!
Adjust the guide rails so that they do not interrupt the light beam!

2. Determining the distance from the device

Measure from the middle of the bottom photocell aligned with the conveyor side frame,
- minimum distance 200 mm, maximum distance 2000 mm,
- mark the distance at the conveyor side frame.



3. Attachment of rejector supports

3.1. Determine the attachment point of the first rejector support at the conveyor side frame, for this purpose,
- keep the marking on the conveyor side frame as distance to the bottom photocell,
- determine the height,
  the attachment must not cause an obstruction in the conveyor side frame.

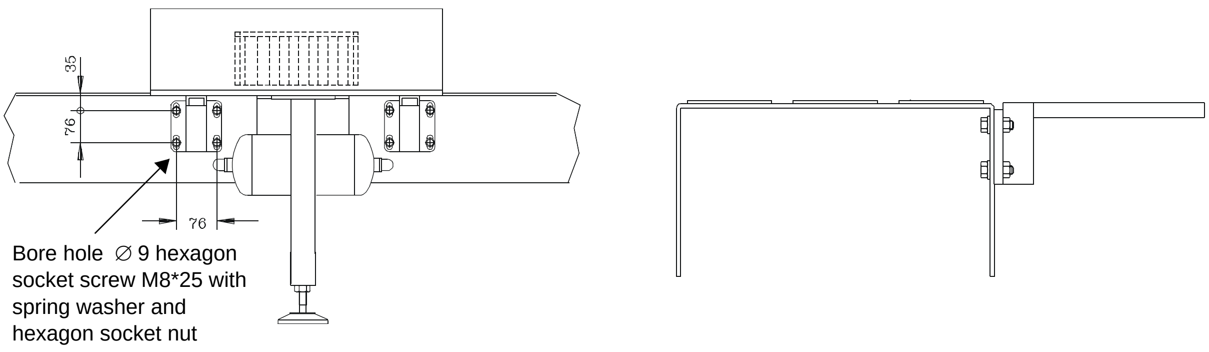
3.2. Place the rejector support on the conveyor side frame and mark the position,
- the squared opening from top to bottom,
- align it horizontally and in parallel,
- mark the attachment holes on the conveyor side frame.

3.3. Determine the attachment point of the second rejector support on the conveyor side frame,
- the distance between the centres of first and second rejector support is 420 mm for a *DELTA-FW* with 10 segments and 540 mm with 16 segments,
- height alignment with reference to the first rejector support,
  the attachment must not cause an obstruction in the conveyor side frame,
  if necessary, adjust to the first rejector support.

RB *basic* V8.00

3.4. Place the rejector support on the conveyor side frame and mark the position,
- the squared opening from top to bottom,
- align it horizontally and in parallel,
- mark the attachment holes on the conveyor side frame.

3.5. At the markings drill holes of 9 mm.



Conveyor side frame with attached rejector support

3.6. Mount the rejector support with M8 screw connections. Insert the screws so that the heads are located on the inside of the conveyor side frame.

We do not recommend other attachment methods with bolts, rivets or glue to permit later dismounting.

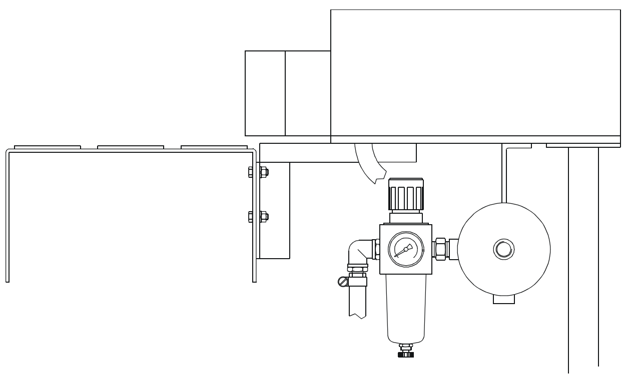
3.7. Align the height of the rejector supports
- flush with the upper edge of the conveyor chain.

4. Mounting the *DELTA-FW*

4.1. Remove the cover of the *DELTA-FW*,
- unscrew the 5 mm hexagon socket screws on the right and on the left with a wrench,
- Lift off the cover.

4.2. Place the mounting plate of the *DELTA-FW* onto the two rejector supports,
- the rejector head is parallel to the conveyor,
- the 4 threaded holes of the supports are visible in the oblong holes of the *DELTA-FW* mounting plate.

4.3. Screw the mounting plate to the rejector supports with M10 screws.
The rejector must be parallel to the conveyor.



5. Mounting the guide rails

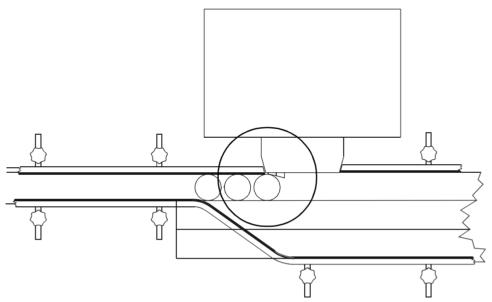
Do not screw the guide rails to the rejector head!

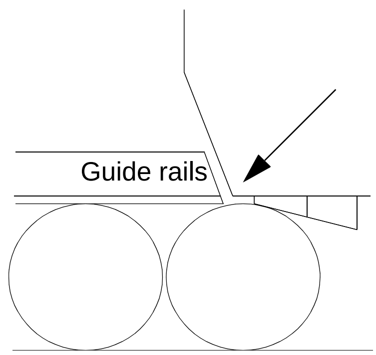
Approach side

5.1. Determine the approach point at the first segment,
- extend the first segment by shifting the piston rod until the limit stop.

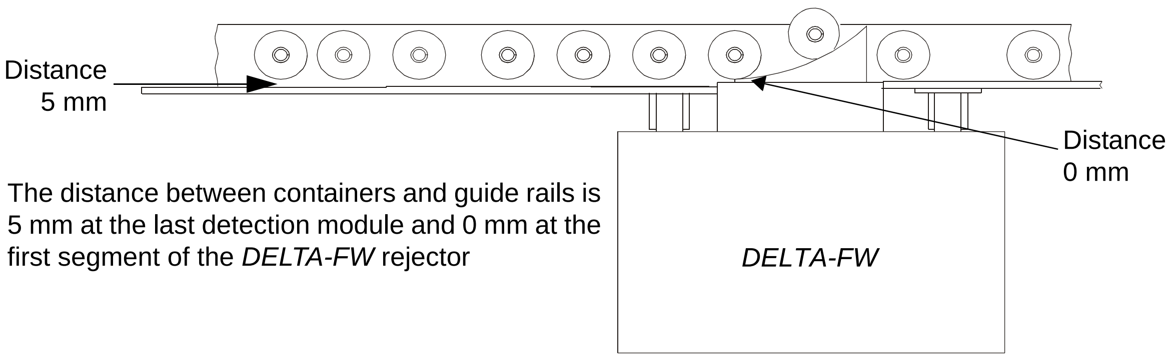
The adjustment of the piston rods must not be changed!

5.2. Guide the containers along the approach guide rails and adjust the guide rails at the same time,
- containers are guided to the begin of the first segment,
- containers do not tumble or skid.





5.3. Adjust the length of the guide rails,
- leave a spacing of maximum 5 mm between the end of the guide rails and the rejector head
- the end of the guide rails must not get in contact with the rejector head.



The distance between containers and guide rails is 5 mm at the last detection module and 0 mm at the first segment of the *DELTA-FW* rejector

Outfeed side

5.4. Adjust the guide rails,
- from the rejector head with little spacing and parallel to the conveyor.

If required, the rejector can be shifted further into the conveyor in order to allow for a better guide rail adjustment.

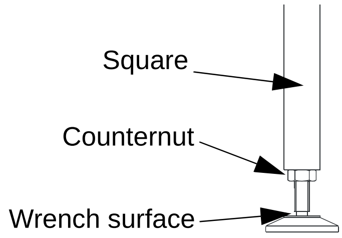
6. Pedestal attachment

6.1. Open the rejector support below the mounting plate.

6.2. Pedestal attachment,
- place the concave foot with the support in the narrow end of the pedestal,
- mounting plate of the pedestal below the rejector,
- if necessary, shorten the square profile,
- attach the pedestal to the bottom side of the rejector with four screws.

6.3. Loosen the counter nut M16 in the concave foot.

6.4. Adjust the height at the wrench surface with an open-jawed wrench SW14,
- until the rejector segments equally touch the containers with their entire height (to the left, to the right). The front edge of the segment must be located vertically above the conveyor.

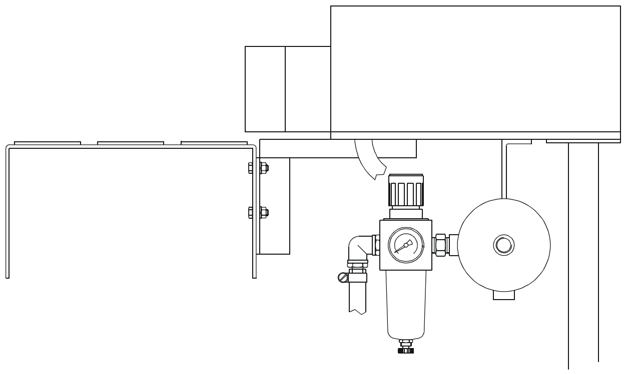


7. Aligning the *DELTA-FW*

Use the 4 bolt connections to realign the mounting plate,
- containers approach at the middle of the first segment,
- the rejector head is parallel to the conveyor and flush with the guide rails.

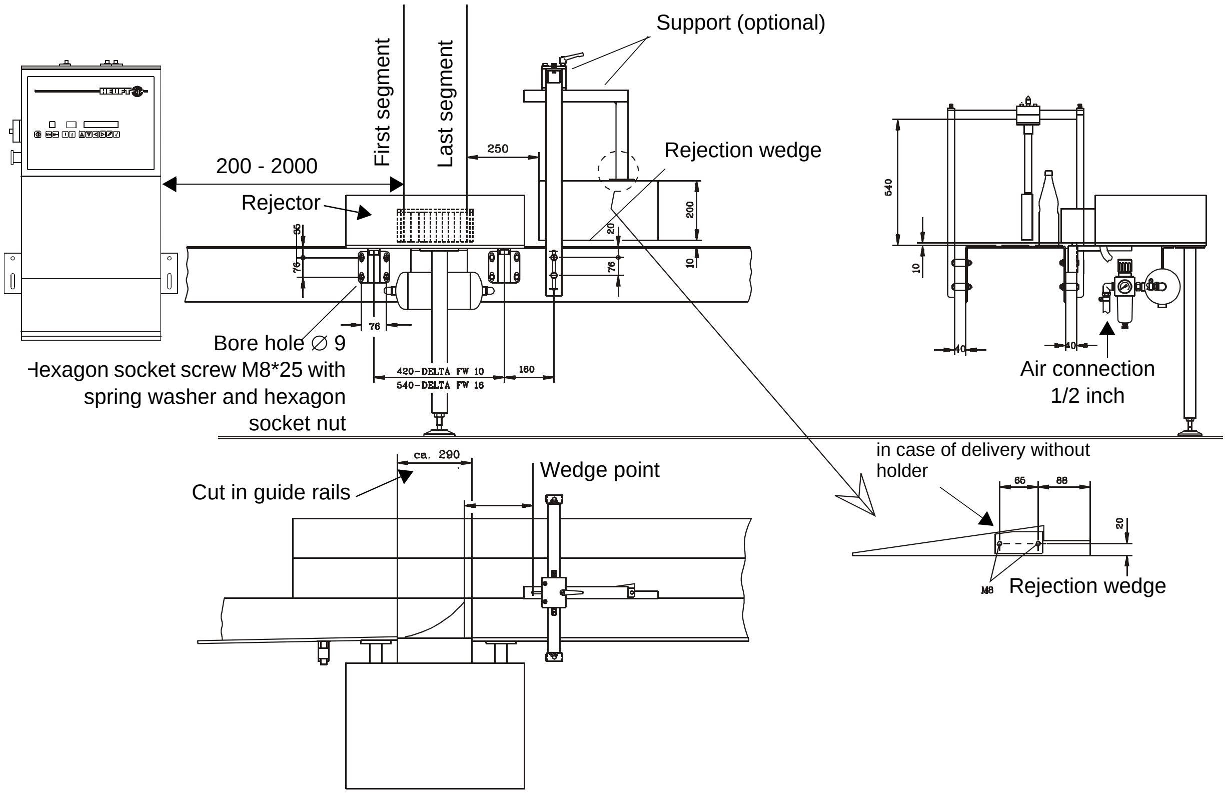
8. Closing the cover

Put the cover to the mounting plate from above,
- Insert the two 5 mm hexagon socket screws in the bore hole and tighten them.



9. Assembling the rejection wedge

The attachment point must be selected so that the tip of the separator is located above the conveyor about 250 mm away from the last segment.
The distance of the separator tip and the height are dependent on container diameters and container heights. The rejection wedge should guide all the containers at the body area (centre of gravity of the container) and should be mounted parallel to the conveyor.



Final mounting work *DELTA-FW* / *DELTA-K* ⇒ Page 142.

Mounting the *DELTA-K* (optional)

1. Mounting the bottom photocell for the *DELTA-K* rejector (optional)

1.1. Remove the black covers, seen in moving direction, they are located on the outside of the frame at the exit side of the device.

1.2. Attach the preassembled square profile support with the bottom photocell,
- transmitter and receiver are visible in the window of the support,
- the window is pointing towards the conveyor,
- the connection cable is pointing downwards,
- attach in the bore holes with two M4 screws.

1.3. Attach the preassembled reflecting mirror to the bow of the device,
- parallel to the photocell on the opposite conveyor side,
- the reflector surface is pointing towards the photocell,
- attach in the prepared bore holes of the bow with M6 screws.

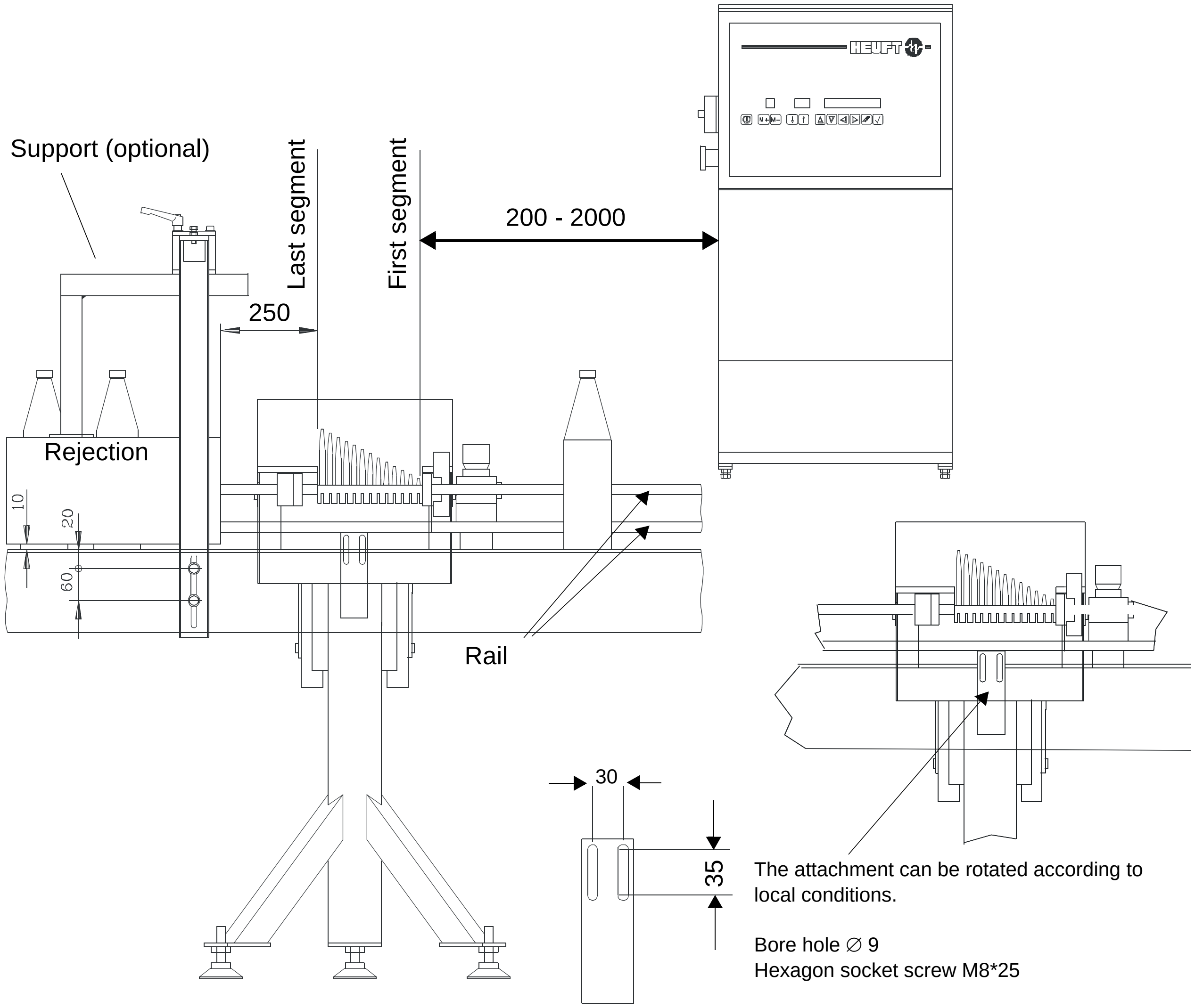
1.4. If required adjust the height of the bottom photocell,
- loosen the photocell in its support,
- shift it until the transmitter and receiver are at the height of the lower edges of the extended rejector segments,
- tighten the photocell again in its support.

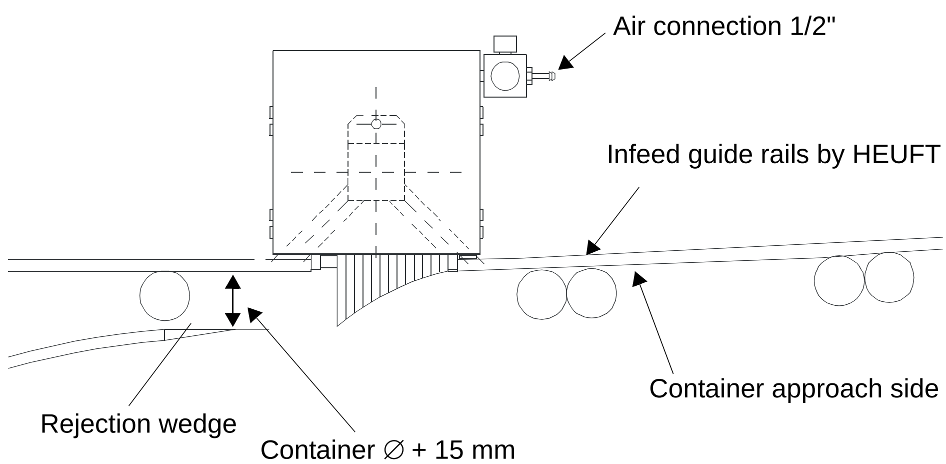
The optical path must not be interrupted by the guide rails. Adjust the guide rails if necessary.

2. Determining the distance from the device

Measure the distance from the last position at the device. This is either the middle of the last measuring bridge, the last trigger position or the middle of the bottom photocell (optional).

- measure along the conveyor side frame, minimum 200 mm, maximum 2000 mm,
- mark the distance on the conveyor side frame,
  this is the reference point for the attachment of the tripod stand.



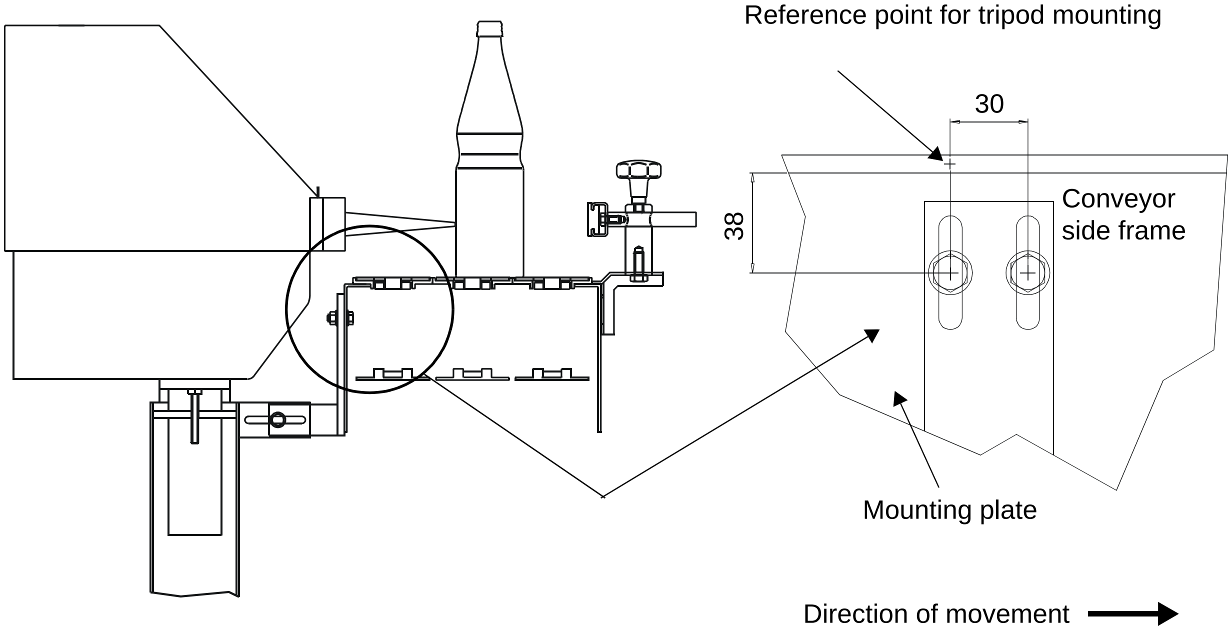


3. Tripod attachment

3.1. The first attachment point for the mounting plate at the conveyor side frame is at the reference point obtained with step 2 above.

- Place the tripod stand so to the conveyor side frame that the first hole of the mounting plate is at the position of the reference point.

If required turn the mounting plate by 180°.



- determine the height,
  the attachment in the conveyor side frame must not cause an obstruction.

3.2. Put the mounting plate to the conveyor side frame,

- the mounting plate must rest level on the surface of the conveyor side frame,
- adjust the vertical leg of the tripod stand approximately perpendicular,
- compensate for uneven floor conditions or slopes by adjusting the concave feet,
- mark the two attachment holes for the mounting plate so at the conveyor side frame that the bolt connection does not cause damage to lines at the inside or obstructions to conveyor movement.

3.3. Mark the bore holes for the base plate in the middle of the openings.

3.4. Remove the tripod stand from the conveyor side frame.

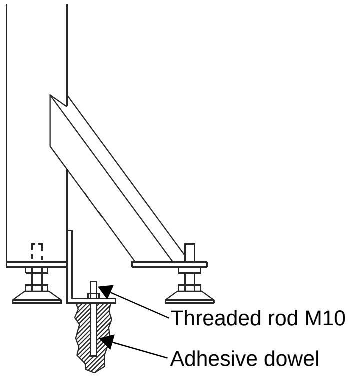
3.5. Drill 9 mm holes at the markings on the conveyor side frame.

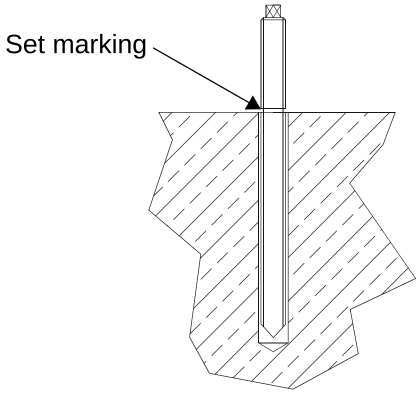
The area around the bore holes for adhesive dowels must be dry. Dampness prevents the plugs from binding.

3.6. Drill plug holes using the marks on the floor (90 mm deep, 12 mm diameter).

3.7. Brush or blow the dowel holes clean.

3.8. Insert the adhesive dowel cartridges into the bore holes (do not use damaged cartridges!).





3.9. Attach the tip of the anchor bolt in the drill chuck, drive the anchor bolt slowly to the bottom of the bore hole with the hammer function switched on.
Mounting is correct when the set marking of the anchor bolt is flush with the edge of the bore hole and the circular gap is filled with cement.

3.10. Await the setting of the cement.

Temperature in the ground °C	Setting time
more than 20°	10 minutes
10 to 20°	20 minutes
0 to 10°	60 minutes
-5 to 0°	5 hours

3.11. Place the tripod stand at the desired position at the conveyor side frame,
- feed the anchor bolts through the holes of the base plate.

3.12. Mount the mounting plate for the conveyor side frame with M8*25 screws, insert the screws so that the heads are at the inside of the conveyor side frame.

3.13. Check the solid stand of the concave feet, tighten the counter nuts of the concave feet.

3.14. Tighten every anchor bolt of the base plate with a washer and a nut.

We do not recommend other attachment methods with bolts, rivets or glue to permit later dismounting.

4. Mounting the *DELTA-K*

4.1. Unscrew the clamping lever from the support below the rejector head.

4.2. In case of a *DELTA-K* with vertical adjustment (optional): turn the crank of the vertical adjustment clockwise until the lock.

4.3. Place the rejector head on the three-legged stand.

4.4. In case of a *DELTA-K* with vertical adjustment (optional): turn the crank of the vertical adjustment anti-clockwise until the rejector head has attained the position for the desired container type.

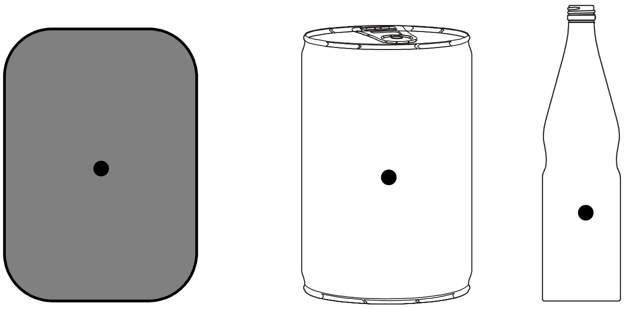
The height of the rejection segments above the conveyor depends on the containers. The middle of a rejector segment must be at the height of the centre of gravity of a container.

Determine the centre of gravity of the different container brands.

The following procedure can be used to help:
Lay the container on its side on a table and push it over the edge so far that the container only just does not fall down. This is an indicator for the centre of gravity of the container.
As soon as the container falls off the table, the centre of gravity has been exceeded.

If the centres of gravity of the different container brands vary too strongly, the height of the rejector must be adjusted whenever changing the brand.

● Centre of gravity



4.5. Screw the clamping lever again to the support and tighten it.

5. Mounting the guide rails (optional)

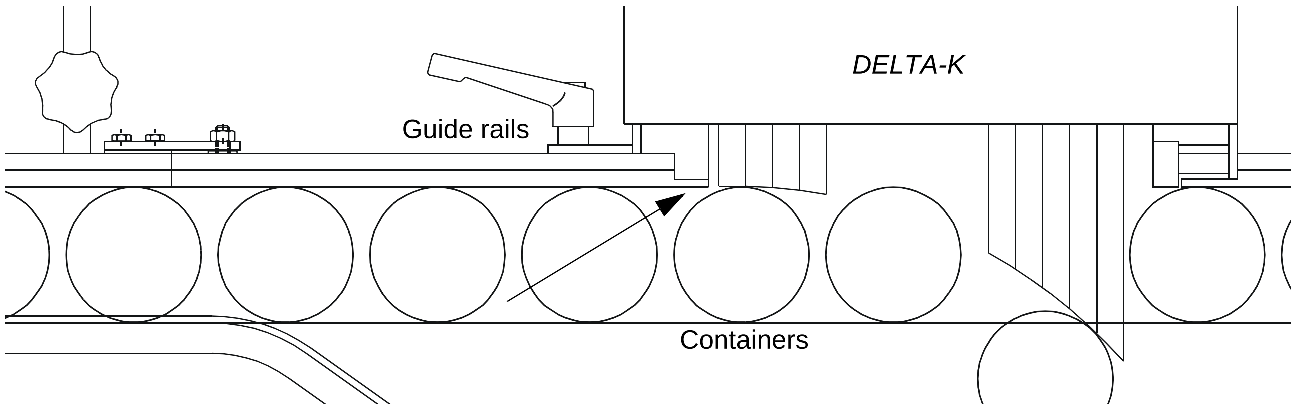
Approach side

Use the included guide rail parts.

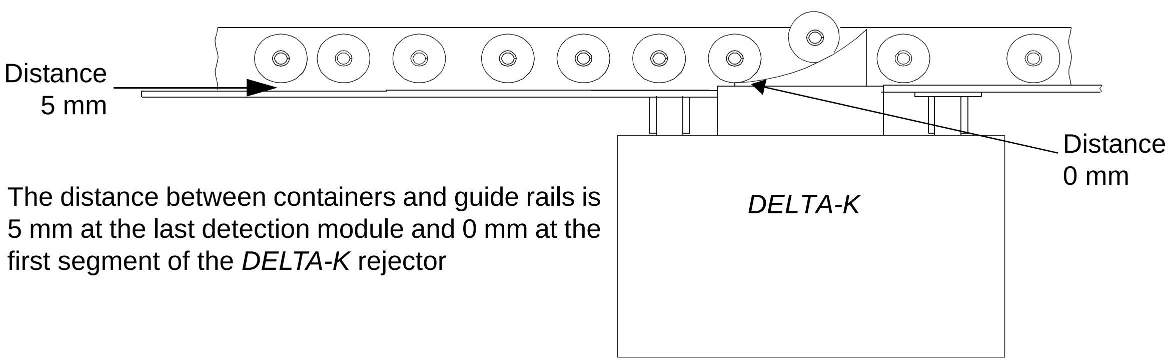
5.1. Determine the approach point at the first segment,
- extend the first segment manually.

The setting of the threaded rods must not be changed!

5.2. Guide the containers along the approach guide rails and adjust the guide rails at the same time,
- the containers are guided to the middle of the first segment,
- containers do not tumble or skid.



5.3. Adjust the length of the guide rails,
- screw the elbow of guide rail part 2 with M 6 screws to the rejector head,
- shorten the guide rail part 1 from the direction of the device to a suitable length that permits guide rail part 2 to move upwards and downwards when adjusting the height of the rejector head.



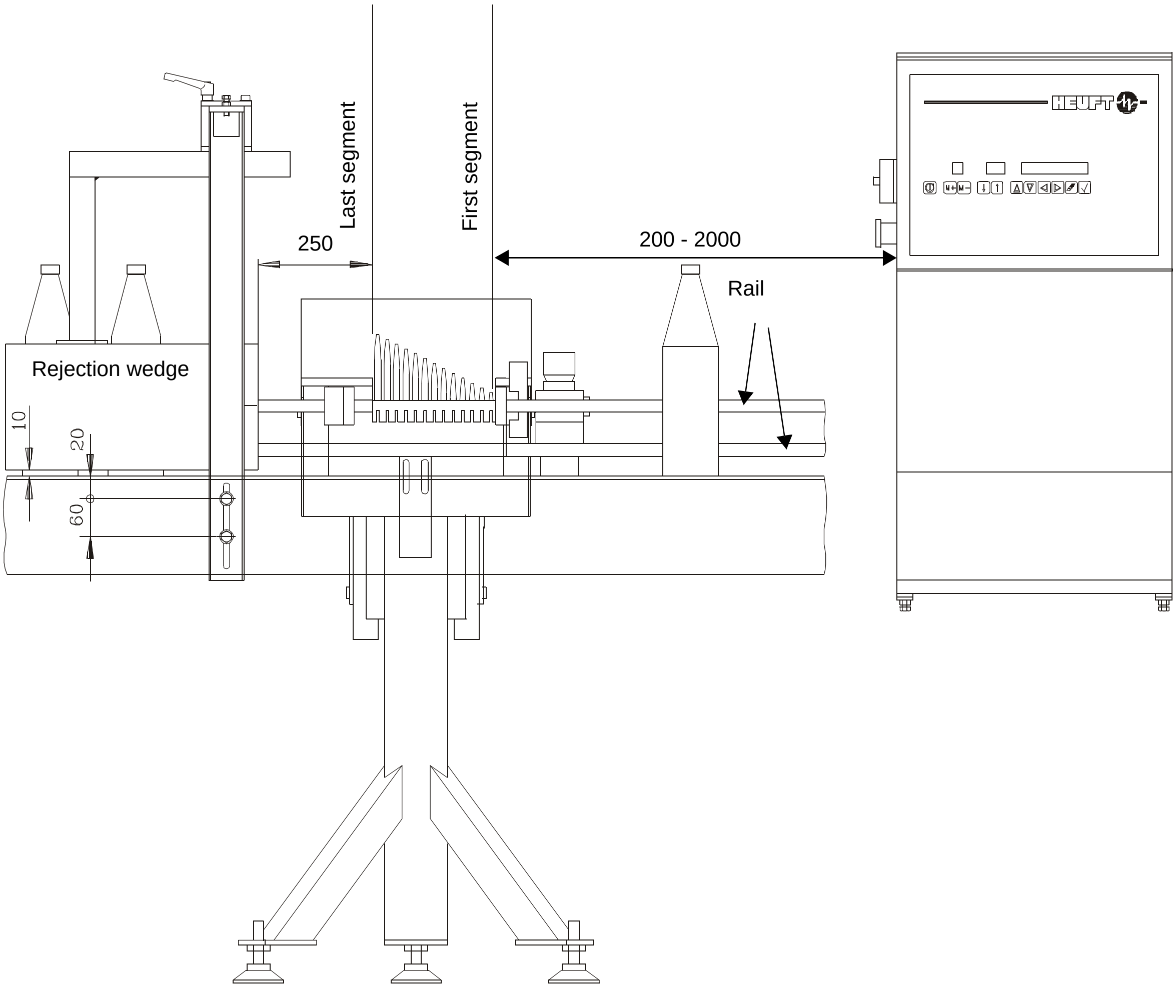
The distance between containers and guide rails is 5 mm at the last detection module and 0 mm at the first segment of the *DELTA-K* rejector

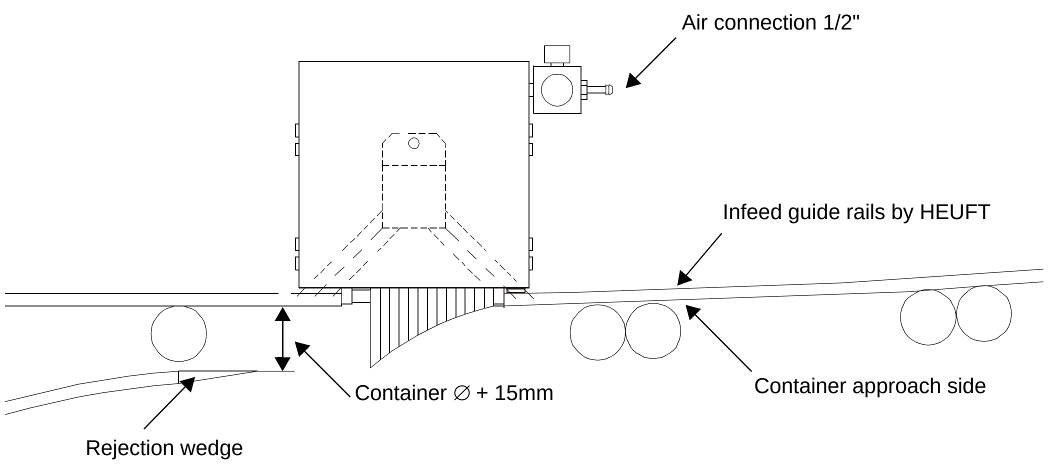
Outfeed side

5.4. Adjust the guide rails,
- from the rejector head with little spacing and parallel to the conveyor.

6. Assembling the rejection wedge

The attachment point must be selected so that the tip of the separator is located above the conveyor about 250 mm away from the last segment.
The distance of the separator tip and the height are dependent on container diameters and container heights.
The wedge should guide all containers in the body area (centre of gravity) and should be mounted parallel to the conveyor.

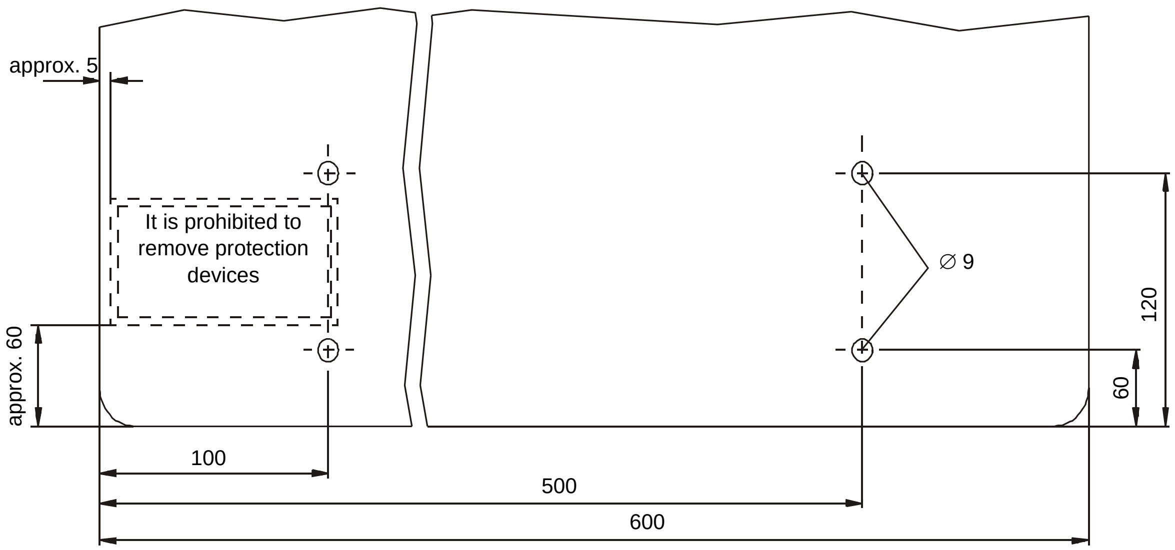




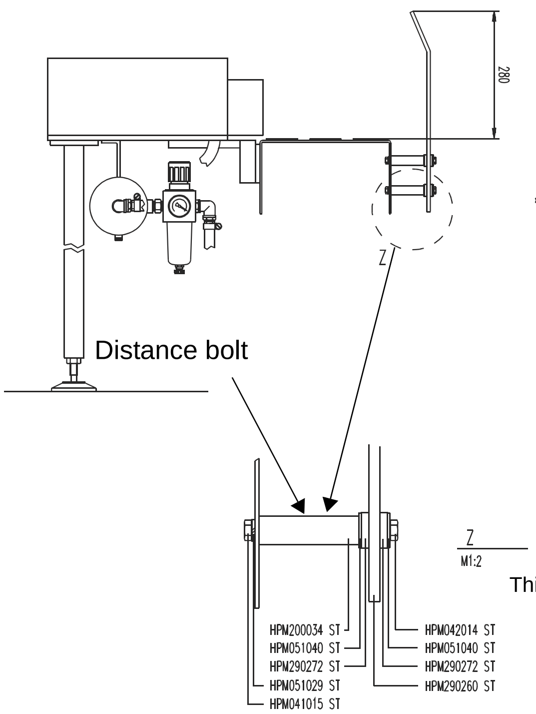
Final mounting work *DELTA-FW* / *DELTA-K*

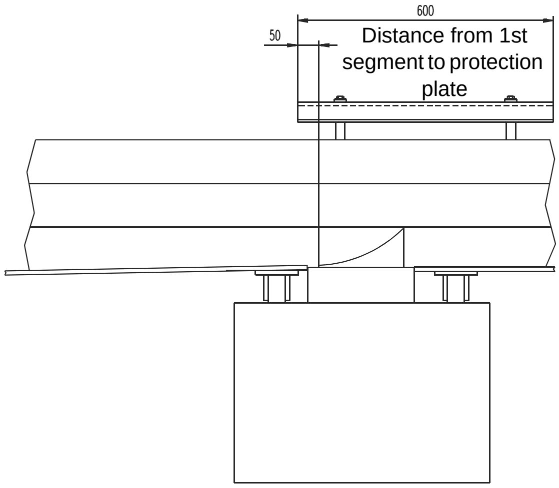
1. Assembling the contact protection device

1.1. Drill holes into the conveyor side frame centred opposite to the rejector segments, according to the measures given in the drawing, mark the holes so that the protection device is reliably held at 300 mm above the conveyor.



1.2. Mount the contact protection device with M8 screws and distance bolts.



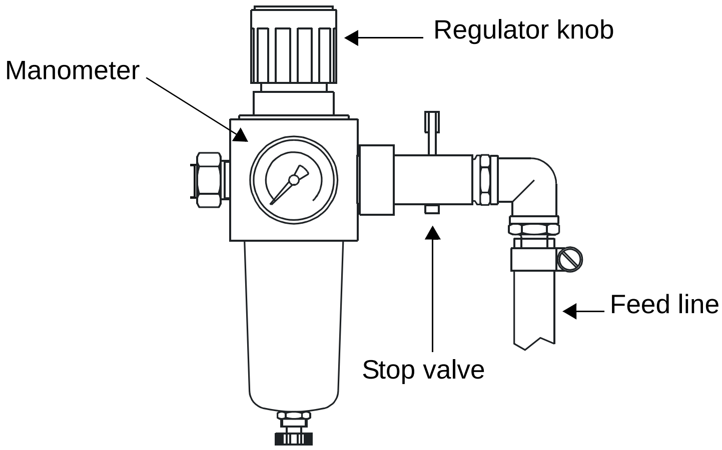


This mounting instruction is valid for: *DELTA-FW*; 10 segments
DELTA-FW; 16 segments
DELTA-K

2. Connecting the compressed-air supply

2.1. Mount the air supply line,

- lead the flexible 1/2 inch supply hose to the connector piece at the manometer (supply pressure 6 bar),
- put the supply hose over the connector piece,
- attach it with a hose clamp and tighten it.



2.2. Open the air supply.

- Clear the rejection area,
- open the stop valve,
- set pressure at the regulator to 3 bar for the *DELTA-K* and to 4 bar for the *DELTA-FW*.

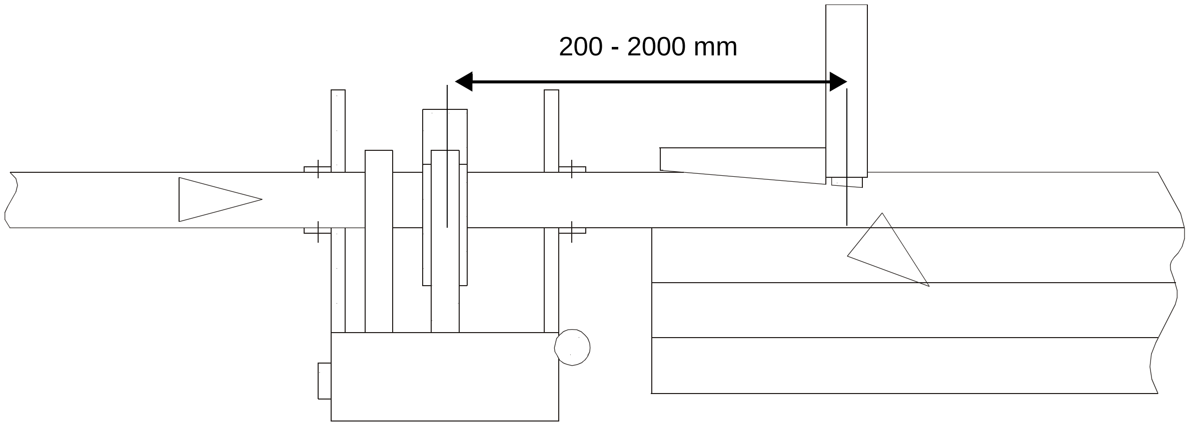
Mounting the *mono* (optional)

The standard *mono* rejects to the right. If a *mono* with rejection direction to the left is required on location, the *mono* must be modified. The modification can be carried out during mounting.

1. Determining the distance from the device

Measure from the middle of the last detection module along the conveyor side frame,

- mark the distance on the conveyor side frame, minimum 200 mm, maximum 2000 mm.



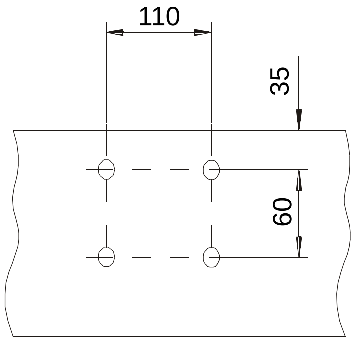
2. Attaching the flange clamping piece

2.1. Determine the attachment point of the flange clamping piece on the conveyor side frame, for this purpose

- keep the marking on the conveyor side frame as distance to the last detection module,
- determine the height,
- the attachment must not cause an obstruction in the conveyor side frame.

2.2. Place the flange clamping piece to the conveyor side frame and mark the position,

- the squared opening from top to bottom,
- align it horizontally and in parallel,
- mark the attachment holes on the conveyor side frame.



2.3. At the markings drill holes of 9 mm.

2.4. Mount the flange clamping devices with screws M8,

- insert the screws so that the heads are located at the inside of the conveyor side frame.

We do not recommend other attachment methods with bolts, rivets or glue to permit later dismounting.

3. Mounting the *mono*

3.1. Insert the *mono* in the flange clamping piece so that,

- the approach section runs in parallel to the conveyor,
- the rejector segment is pointing towards the conveyor chain.

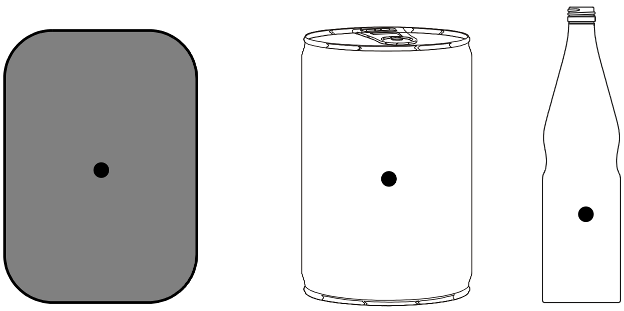
3.2. Tighten the *mono* in the flange clamping piece.

The height of the *mono* above the conveyor depends on the container brand. The middle of a rejector segment must be at the height of the centre of gravity of a container.

Determine the centre of gravity of the different container brands.

The following procedure can be used to help:
Lay the container on its side on a table and push it over the edge so far that the container only just does not fall down. This is an indicator for the centre of gravity of the container.
As soon as the container falls off the table, the centre of gravity has been exceeded.

If the centres of gravity of the different container brands vary too strongly, the height of the rejector must be adjusted whenever changing the brand.



● Centre of gravity

3.3. Vertical adjustment with the flange clamping piece,

- loosen the flange
- adjust the middle of the rejector segment to the height of the respective centre of gravity,
- in case of different container types mark the height appropriately,
- tighten the flange.

4. Checking the *mono* reject direction

When the extending rejector segment moves a container to the **right** seen in moving direction, continue *mono* mounting as described in the section "**6. Aligning the *mono***".

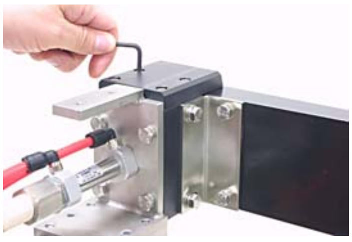
When the extending rejector segment moves a container to the **left** seen in moving direction, continue *mono* mounting as described in the section "**5. Modifying the *mono***".

5. Modifying the *mono*

During the individual steps of the modification work the screws referred to must be kept, because they are needed again later for the same positions.

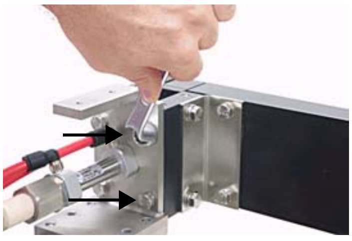
5.1. Release the two M4 bolts on the cover.

5.2. Remove the cover.



5.3. Release the four M4 bolts on the segment cover.

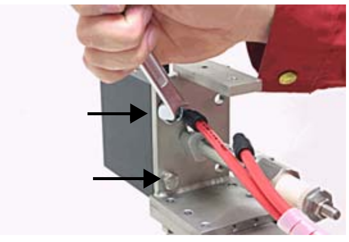
5.4. Remove the segment cover.



5.5. Release the two M8 bolts.

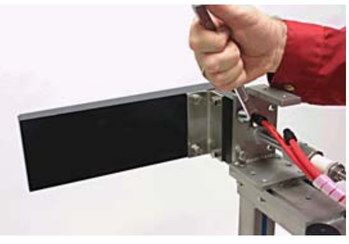
5.6. Remove the container guidance with the segment guidance.

There are tapped holes on both sides in the segment guidances for the cover. Therefore the container guidance does not have to be separated from the segment guidance.



5.7. Release the two M8 bolts in order to remove the segment guidance on the outfeed side.

5.8. Remove the segment guidance.



5.9. Turn the container guidance by 180° and attach it side with the segment guidance to the old outfeed side with two M8 bolts.

The segment guidance has to be aligned parallel to the segment so that the segment does not become jammed.

5.10. Attach the segment guidance with two M8 bolts to the new outfeed side.

The segment guidance has to be aligned parallel to the segment so that the segment does not become jammed.

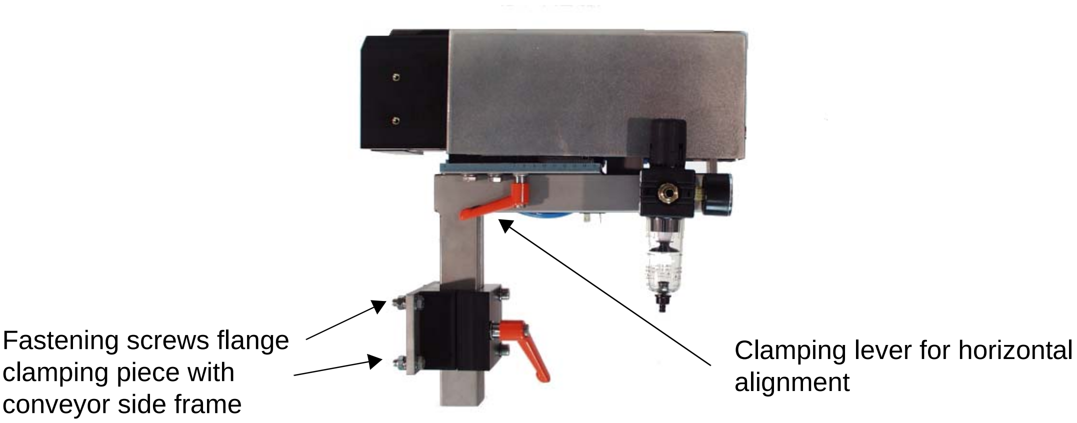
5.11. Place the segment cover on the segment guidances and fasten with four M4 bolts.

5.12. Replace the cover and fasten with two M4 bolts.

6. Aligning the *mono*

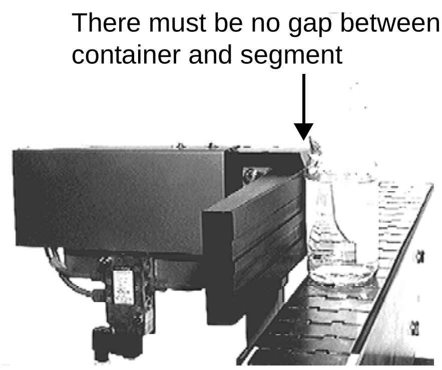
6.1. Alignment to the conveyor. The rejection segment must be at right angles to the conveyor, so that the containers are touched continuously over the whole height of the segment. If this is not the case,

- loosen the nuts of the flange clamping piece at the conveyor side frame,
- by means of distance plates align the rejector in such a way that the rejection segment is at right angles to the conveyor,
- tighten the nuts.



6.2. Horizontal alignment of the rejection segment

- loosen the clamping lever for horizontal alignment,
- Shift the rejector in such a way that the rejection segment ends where the conveyor starts.
- Tighten the clamping lever.



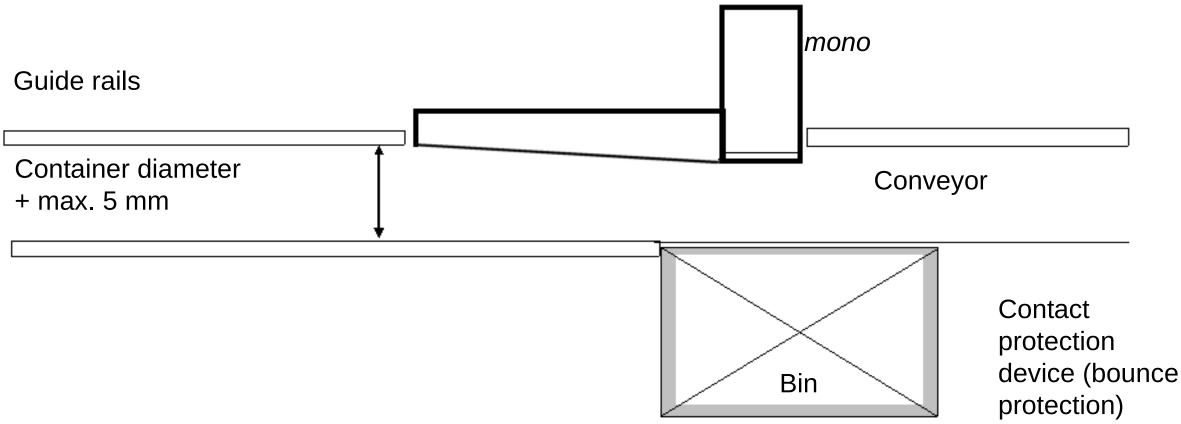
7. Mounting the guide rails

Do not screw the guide rails to the approach section!

Approach side

7.1. Guide the containers along the approach guide rails and adjust the guide rails at the same time,
- containers are guided along the approach section,
- containers do not tumble or skid.

7.2. Adjust the length of the guide rails,
- leave little spacing between the end of the guide rails and the approach section.



Outfeed side

7.3. Adjust the guide rails,
- beginning at the rejector head with little parallel spacing to the conveyor.

8. Closing the cover

Put the cover to the mounting plate from above,
- insert the two 5 mm hexagon socket screws in the bore holes and tighten them.

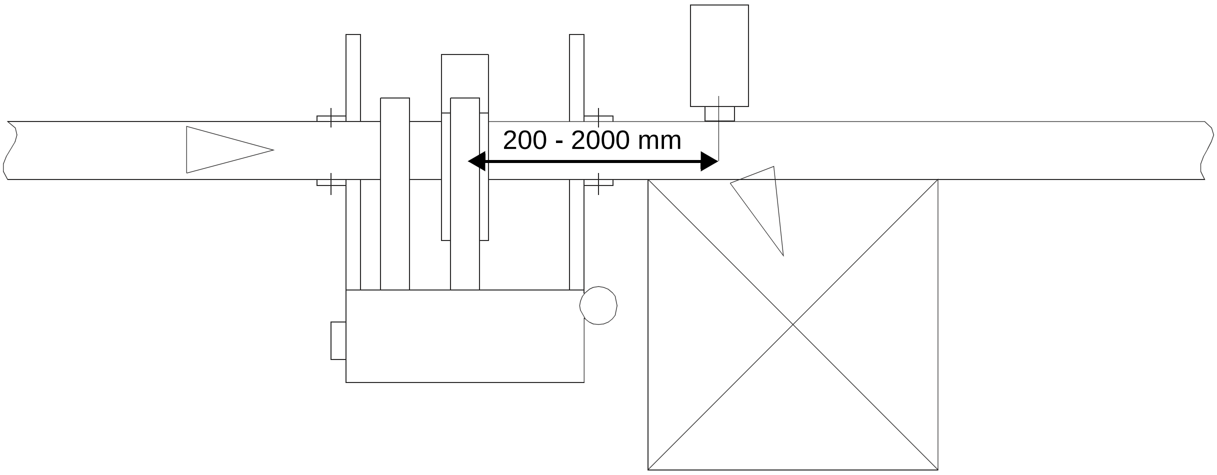
Final mounting work ⇒ Final mounting work mono / pusher / flip, page 157

Mounting the *pusher* (optional)

1. Determining the distance from the device

Measure from the middle of the last detection module along the conveyor side frame,

- mark the distance on the conveyor side frame, minimum 200 mm, maximum 2000 mm.



2. Attaching the flange clamping piece

2.1. Determine the attachment point of the flange clamping piece on the conveyor side frame, for this purpose

- keep the marking on the conveyor side frame as distance to the last detection module,
- determine the height,
- the attachment must not cause an obstruction in the conveyor side frame.

2.2. Place the flange clamping piece to the conveyor side frame and mark the position,

- the squared opening from top to bottom,
- align it horizontally and in parallel,
- mark the attachment holes on the conveyor side frame.

2.3. At the markings drill holes of 9 mm.

2.4. Mount the flange clamping devices with screws M8,

- insert the screws so that the heads are located at the inside of the conveyor side frame.

We do not recommend other attachment methods with bolts, rivets or glue to permit later dismounting.

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3. Mounting the *pusher*

3.1. Insert the *pusher* in the flange clamping piece so that,

- the rubber bumper is pointing towards the conveyor chain.

3.2. Tighten the *pusher* in the flange clamping piece.

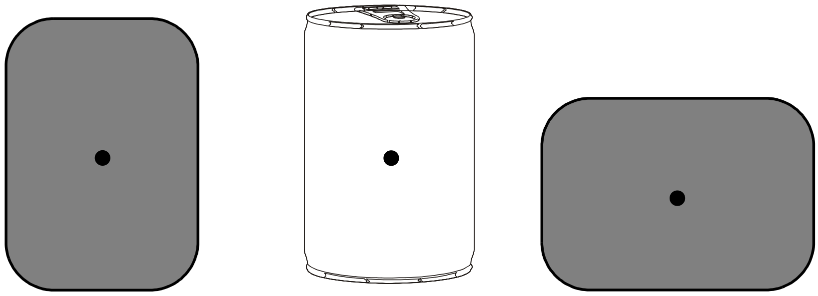
The height of the *pusher* above the conveyor depends on the container brand. The middle of the rubber bumper must be at the centre of gravity for the respective container.

3.3. Determine the centre of gravity of the different container brands.

The following procedure can be used to help:
Lay the container on its side on a table and push it over the edge so far that the container only just does not fall down. This is an indicator for the centre of gravity of the container.
As soon as the container falls off the table, the centre of gravity has been exceeded.

If the centres of gravity of the different container brands vary too strongly, the height of the rejector must be adjusted whenever changing the brand.

● Centre of gravity



3.4. Vertical adjustment with the flange clamping piece,

- loosen the flange
- adjust the middle of the rubber bumper to the height of the respective centre of gravity,
- tighten the flange.

4. Mounting the guide rails

Do not attach the guide rails to the cover!

Approach side

4.1. Guide the containers along the approach guide rails and adjust the guide rails at the same time in such a way that
- containers are guided along the rubber bumper,
- containers do not tumble or skid.

4.2. Adjust the length of the guide rails,
- leave little spacing between the end of the guide rails and the casing.

Outfeed side

4.3. Adjust the guide rails,
- beginning at the cover with little parallel spacing to the conveyor.

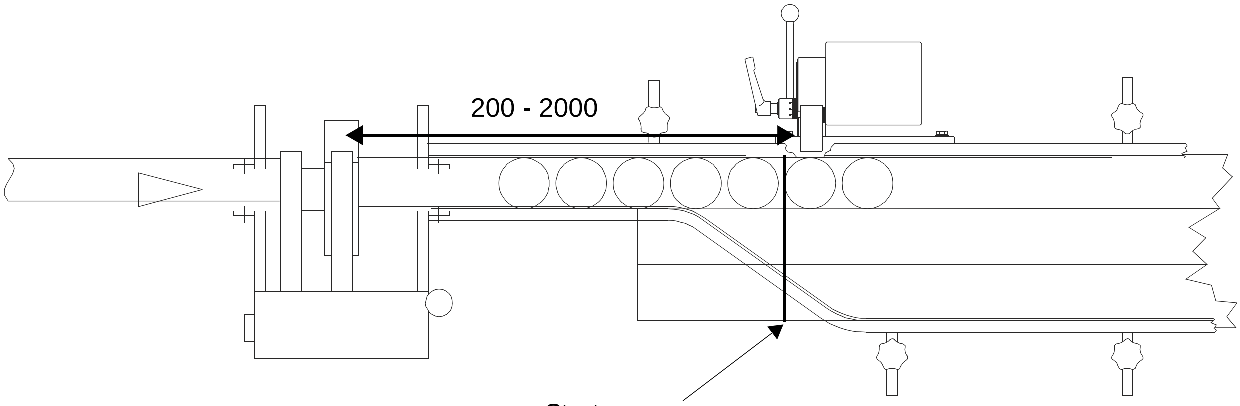
⇒ Final mounting work mono / pusher / flip, page 157

Mounting the *flip* (optional)

1. Determining the distance from the device

Measure from the middle of the last detection module along the conveyor side frame,

- the distance should be as short as possible but at least 200 mm.



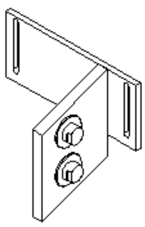
2. Mounting the *flip*

Available bore holes of a guide rail support can be used for attachment. For stability reasons, at least one bore hole of a cross-strut **must** be used. If the appropriate bore hole is not available the cross-struts must be displaced, if required.

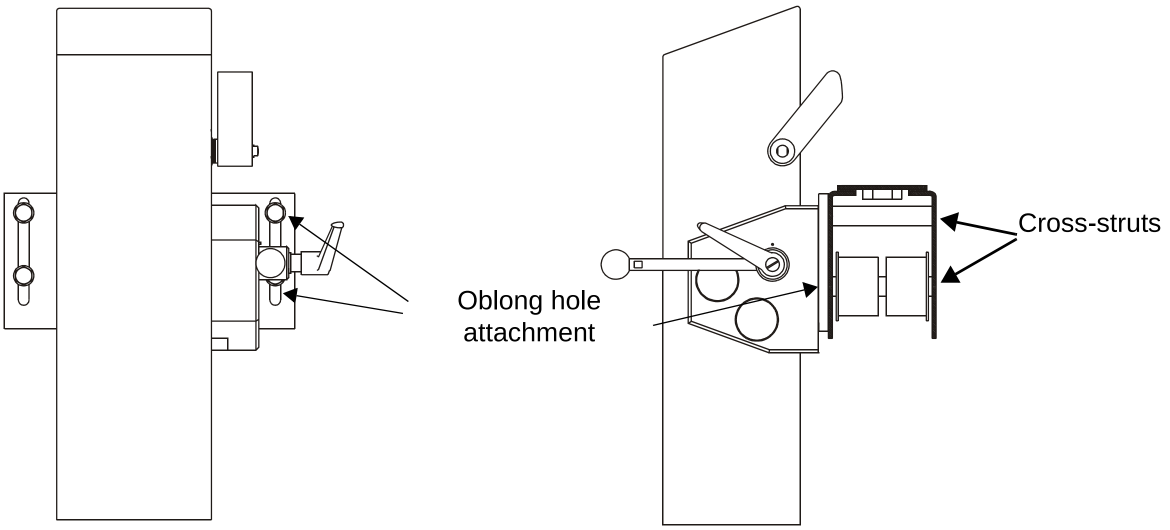
2.1. Remove guide rail support, if applicable.

2.2. Displace cross-struts, if required.

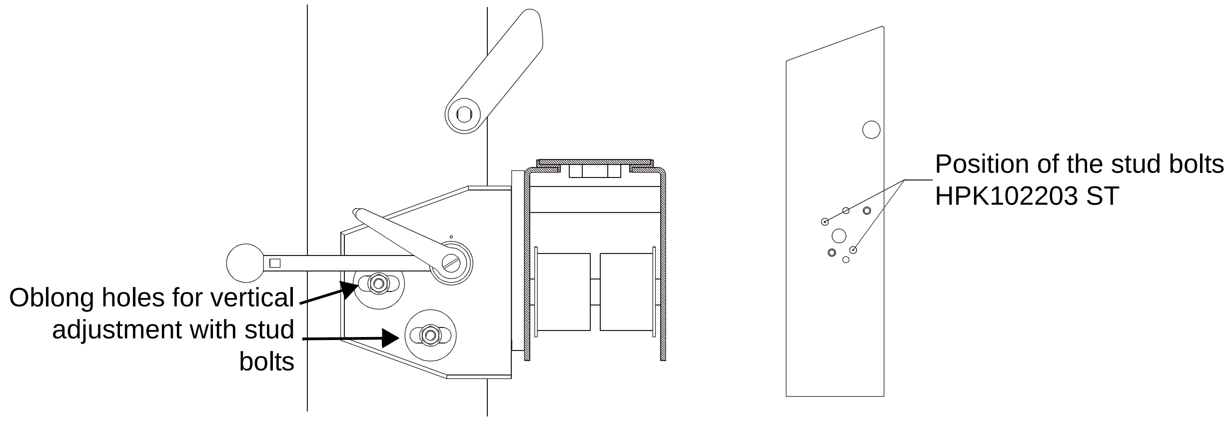
2.3. Attach the base plate of the *flip* to the conveyor side frame with four screws.



Base plate (in the case of a *flip* rejector without vertical adjustment device)



3. Mechanical adjustment (basic setting)



Vertical adjustment

Oblong holes drilled into the base plate serve for the vertical adjustment of the *flip* during the mounting.

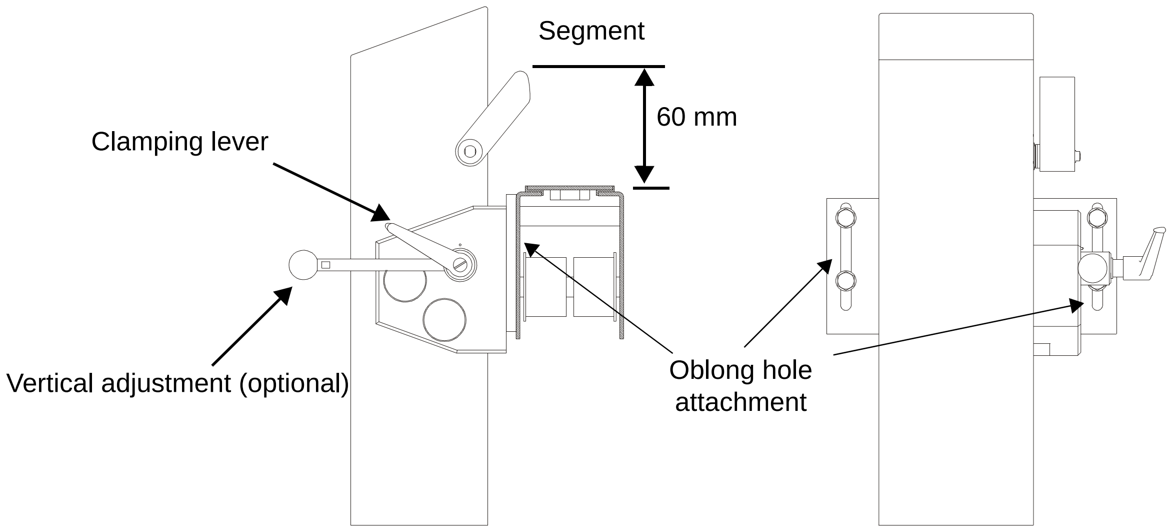
3.1. Put both stud bolts through the oblong holes and screw them to the *flip* cover.
Tighten the stud bolts at that position within the oblong holes where the retracted segment does not touch the passing containers.

Vertical adjustment

The height of the *flip* above the conveyor is dependent on the container type.

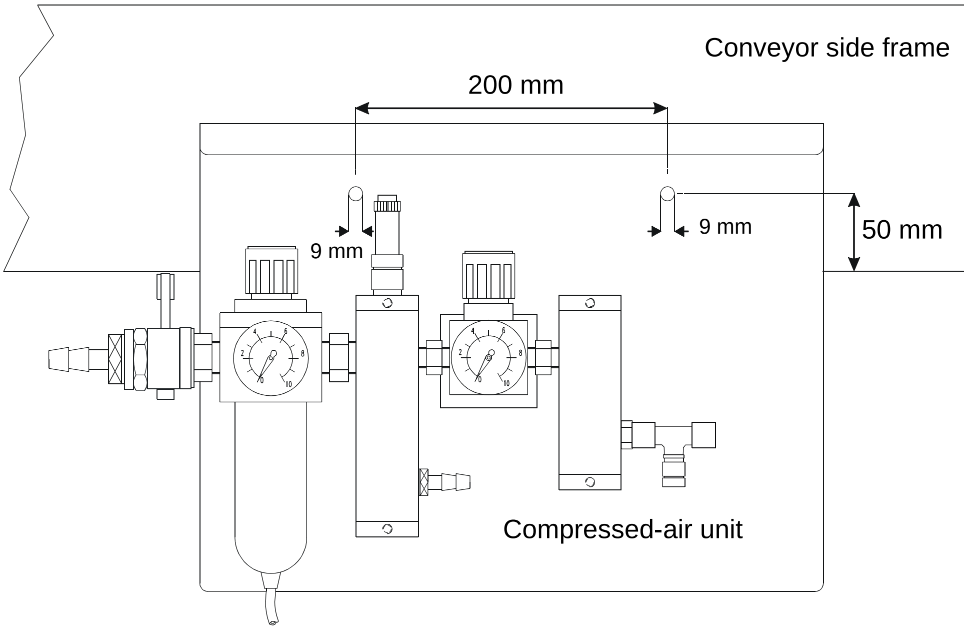
3.2. Only in case of a *flip* with vertical adjustment device (optional): open the clamping lever of the *flip* and adjust the rejector with the vertical adjustment device in such a way
- that the rejector segment is located at the lowest position.

3.3. Attach the *flip* to the conveyor side frame by means of the oblong holes in such a way
- that the segment in its initial position is located 60 mm above the conveyor.

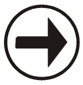


4. Mounting the compressed-air unit

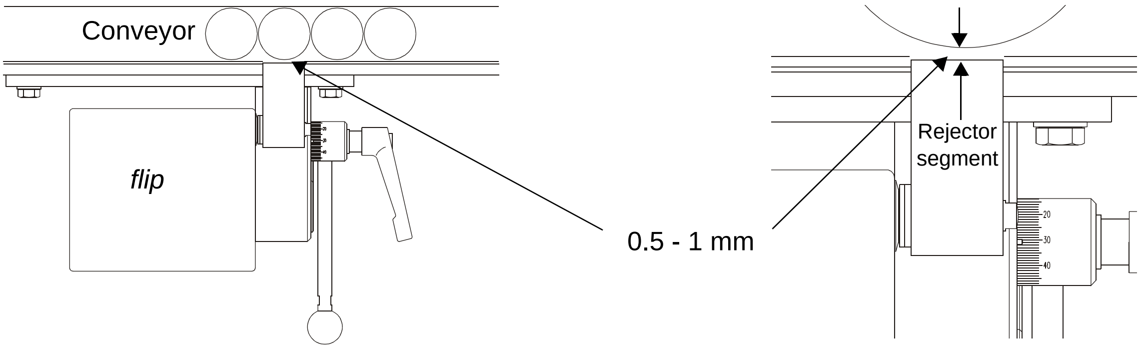
4.1. Attach the compressed-air unit to the conveyor side frame according to the drill plan.



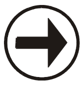
5. Mounting the guide rails



Do not attach the guide rails to the cover!



The distance between the container and the retracted segment must not exceed 0.5 to 1 mm.



If the distance is larger than 1 mm or shorter than 0.5 mm shift the *flip* rejector towards the vertical adjustment device by means of the oblong holes (⇒ Vertical adjustment, page 154).

Approach side

5.1. Guide the containers along the guide rails on the approach side and adjust the guide rails at the same time in such a way that

- the containers are guided along the rejector segment,
- containers do not tumble or skid.

Outfeed side

5.2. Adjust the guide rails,

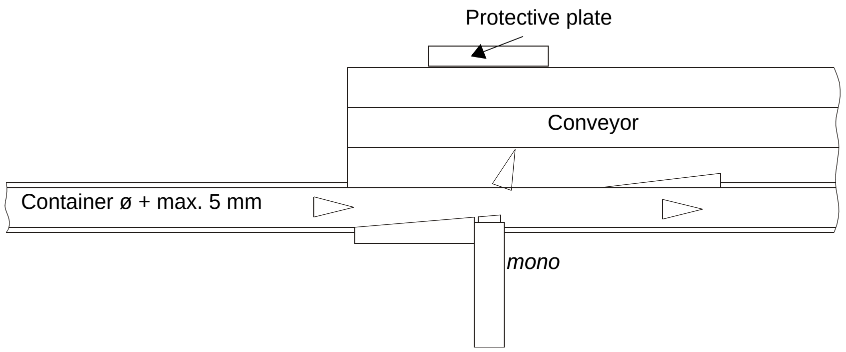
- beginning at the cover with little parallel spacing to the conveyor.

5.3. After completion of the mounting work at the *flip*: close the holes for horizontal adjustment by means of the caps.

Final mounting work *mono / pusher / flip*

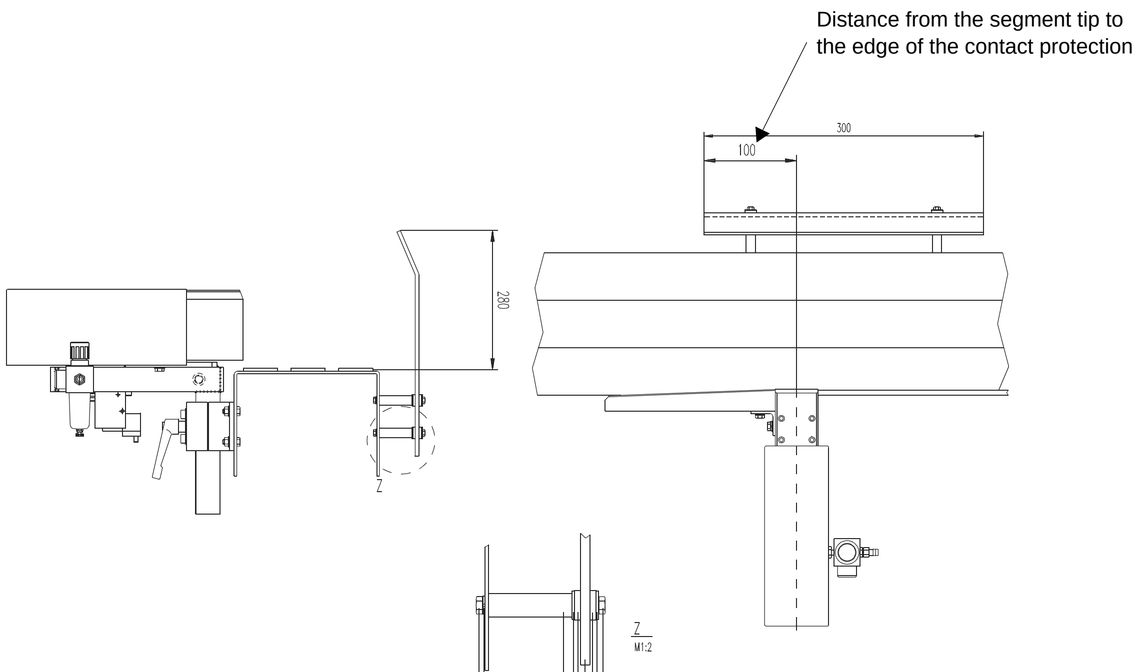
Assembling the contact protection device (optional)

A **protection plate** is mounted in case of rejection to another **conveyor** (⇒1.), a **bounce protection** is mounted when rejecting into a **waste glass container** (⇒ 2.)



Attachment of the protection device (protection plate) for *mono*, *pusher* and *flip* when rejecting to another conveyor

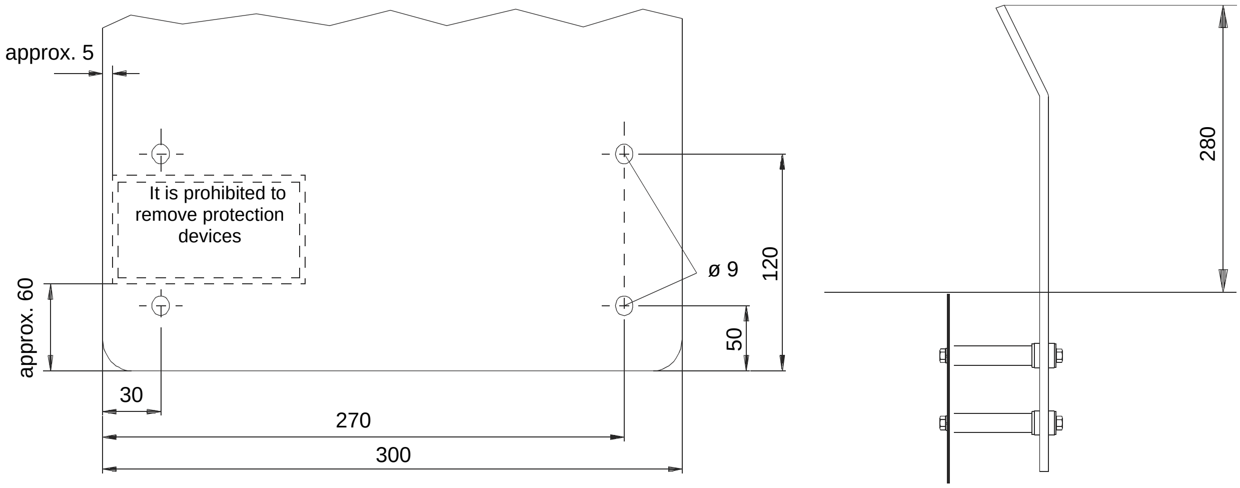
1. Mounting the protection plate



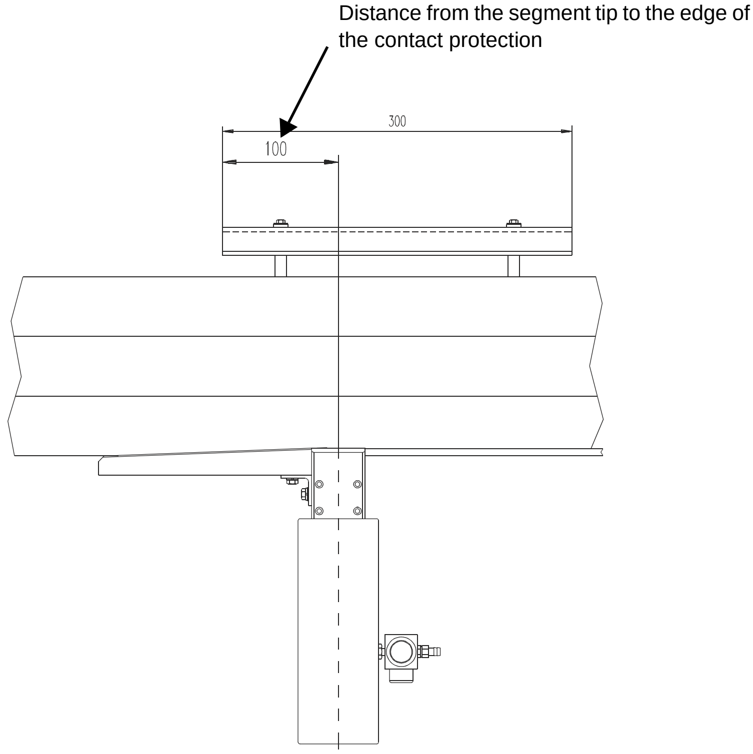
Mounting instructions for the protection plate of rejectors *mono*, *pusher* and *flip.* The illustration shows an example for the *mono* rejector.

1.1. Drill the bore holes in the conveyor side frame opposite the rejector so that the distance from the segment tip to the edge of the protection plate is 100 mm (⇒ illustration above).

1.2. Mark the bore holes according to the measures provided in the drawing so that the protection plate is reliably held. Drill the bore holes (ø 9 mm).



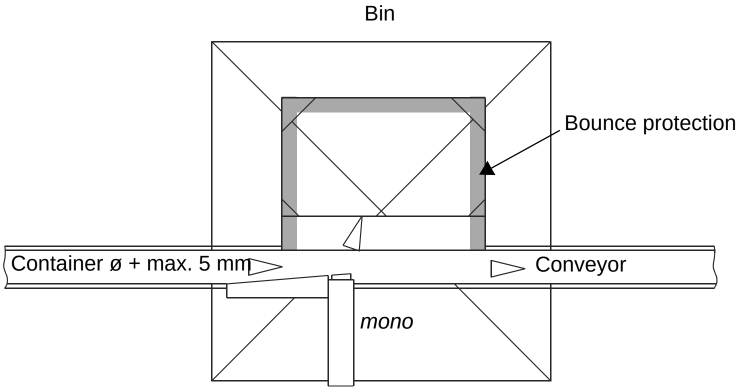
1.3. Mount the protection plate.



Mounting instructions for the protection plate of rejectors *mono*, *pusher* and *flip.*

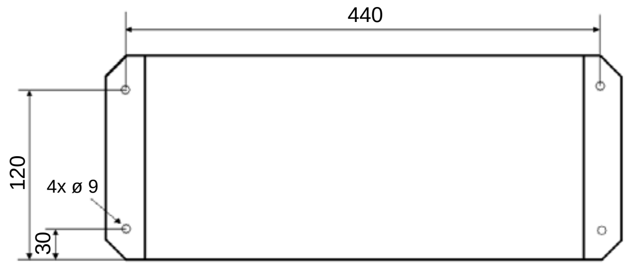
The illustration shows an example for the *mono* rejector.

2. Mounting the bounce protection



Attachment of the contact protection device (bounce protection) for *mono*, *pusher* and *flip* when rejecting into a waste container

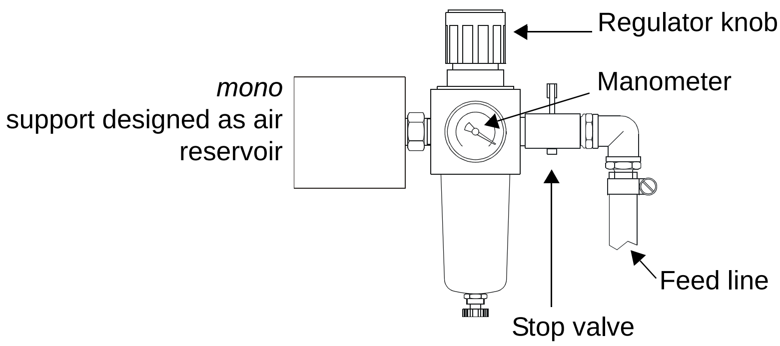
2.1. Mark the bore holes at the cone according to the measures provided in the drawing so that the bounce protection is reliably held. Drill the bore holes (ø 9 mm).

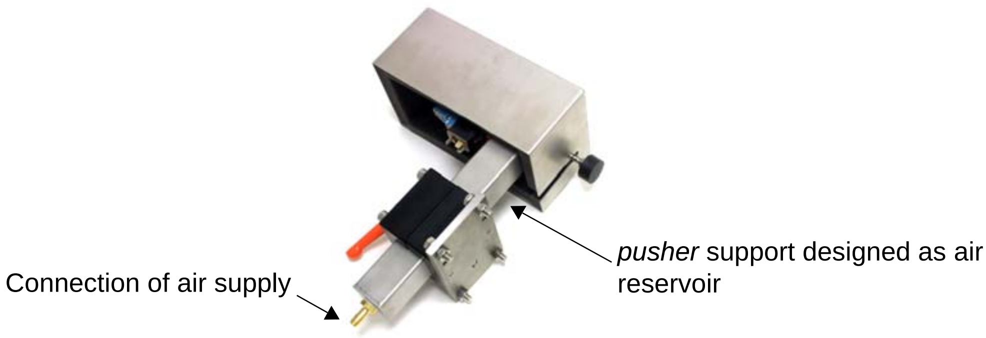


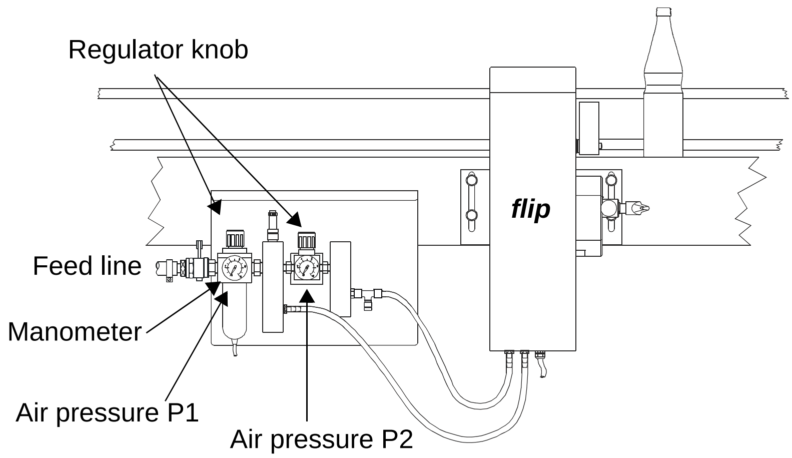
2.2. Mount the bounce protection.

6. Connecting the compressed-air supply

6.1. Mount the air supply line,
- lead the flexible 1/4 inch supply hose (1/2 inch for *flip*) to the connector piece (supply pressure is 10 bar),
- in the case of the *pusher* mount the filter regulator,
- put the supply hose over the connector piece,
- attach it with a hose clamp and tighten it.







Pay attention that the connecting hoses of the *flip* for air pressure P1 and P2 are not exchanged by mistake!

It may be possible that the rejector segment of the *mono* or *flip* or the rubber bumper of the *pusher* extend when establishing the air connection!

6.2. Open the air supply,
- clear the rejection area,
- open the stop valve,
- in case of the rejectors *mono* and *pusher* set the operating pressure to 4 bar. In case of the *flip* rejector the operating pressures P1 and P2 must be determined for every individual container brand.

Mounting the machine detections

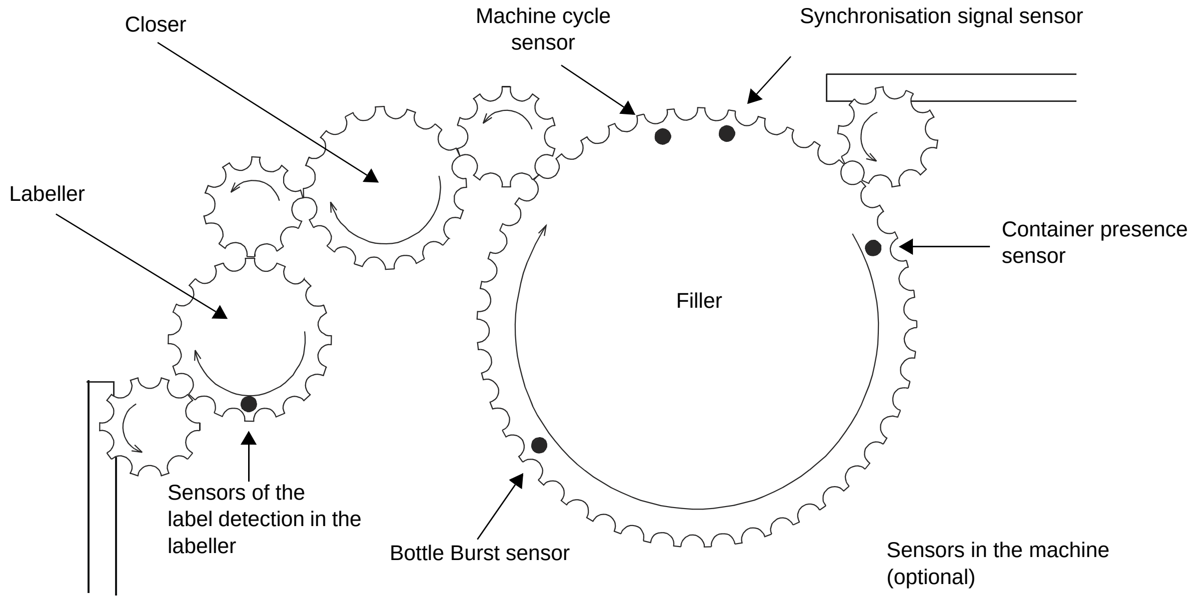
General

The optional sensors for the individual machine detections are installed in the filler, the closer and the labeller. The sensors can only be partly preassembled due to the fact that the construction of the machine on-site is not known.

When mounting the machine detection sensors switch off the conveyor, the filler**,** the closer **and** the labeller and secure them against inadvertent switch-on! The safety regulations must be observed!

When attaching the sensors in and to the machines the mounted parts should not block or damage moving machine parts such as hold-down devices in the filler, deflection pulleys, and so on.

Supply lines installed in or at the machines such as cables or lubrication lines must be placed so that they do not hamper the function of the machine detection sensors.



It is absolutely necessary for the detection quality that the programmed distances remain valid without changes even when there is a change of production container. Therefore, a sensor must always be mounted so that all container shapes will be detected.

Parts of the machine detection modules

Sensors for the respective machine detection modules
Terminal box
Holder
Installation material

Preparations

Selection of the mounting location

The machine detection is dependent on the conditions on location.

When selecting the mounting location, care must be taken that:

- the sensors must not be covered or disturbed
- the sensors must not hinder any other operating sequences
- the sensors are installed so that their position must not be changed when changing brands.

Mounting the sensor

Stop the conveyor and the machine and lock it out to prevent inadvertent switch-on!
Remove the containers from the conveyor in the mounting area.

1. Attaching the holder

Mount the sensor supports at the appropriate positions.

2. Mounting the sensor

2.1. Screw the sensor to the holder.

2.2. Align the sensor to the specified detection position so that all types of containers can be detected.

Terminal box mounting

A terminal box is installed near the filler or the labeller so that only one cable connection is required between these machines and the standard device. The terminal box must be mounted so that it is protected against mechanical damage.

Close all bore holes with dummy plugs or armoured conduit fittings to avoid the penetration of moisture into the terminal box. An O-ring must be put below all armoured conduit fittings and dummy plugs during mounting.

1. Fix the mounting location.

2. Attach the terminal box in a suitable way.

End of mounting

The following is required after the mounting of all components:

1. Embed the control cables from the individual components to the standard device.

2. Embed the power supply cable to the standard device.

3. Clear the mounting area.

4. Check the mounting area,
   - whether there are still parts or tools, remove them if any,
   - whether all connections are fixed.

5. Switch on the conveyor.

Installation

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Preparations

General

After the previous mechanical assembly of the individual components to a complete device, this chapter describes the electrical connection of all components.

Only an electrician is authorised to install the device.
Do not carry out the installation unless the conveyor has stopped! Secure the conveyor to prevent it being inadvertently switched on!

Danger of electric shock!
The mains power supply has live voltages of 230 V (115 V).
Electricians only are authorised to do work at the power supply cable!
Cut the voltage of the mains supply line according to the German standard DIN VDE 0105 before working at parts with live voltage (such as the installation of the mains supply line):
- cut the voltage of the supply cable
- Secure it to prevent it being inadvertently switched on e.g. by removing the fuses or applying a prohibitive sign!
- Check the dead voltage condition e.g. with a voltmeter.

When interrupting the installation work, recheck the dead voltage condition of the mains power supply cable before resuming work.

Radioactivity (fill level detection Gamma and residual liquid detection Gamma)!
ONLY persons trained and licensed by HEUFT Company for repair of radioactive devices are authorised to open the measuring bridge.

X-radiation! (X-ray fill level detection)
ONLY persons trained and licensed by HEUFT Company for the repair of x-raying devices are authorised to open the measuring bridge on the emitter side.

The existing safety regulations must be observed.
Switch-off the main power switch prior to connecting or disconnecting power supply cables.

Several sealed potentiometers are installed within the control unit. They have been set during factory assembly. The sealing prevents a change of settings.

The following paragraphs describe the connection of all optional detection modules and equipment of the device. Depending on the individual equipment of a device, all options are not always available. The corresponding installation instructions are not applicable in such a case.

The connection is carried out according to the wiring diagram which is included on the device CD of the operator's manual as a reference.
The designations used in the wiring diagram correspond to the German standard DIN 40719-2:6/1978.

Tool list

We recommend to have the following tools available for a rapid and correct electrical installation of the device:

1 set of screw drivers each
- flat
- crossed

1 set of wrenches each
- hexagon socket
- open-jawed

pointed pliers
side cutter
clamp pincers for end sleeves of strands
clamp pincers for cable brackets
multimeter
voltage tester for mains supply voltage
lever to operate the connection terminals (delivered with the device)

Connection cable

The connection cables for sensors and measuring bridges are prefabricated.

Do not shorten cables, if required lay loops within a cable duct.

Armoured conduit fittings in the bottom of the casing

With the exception of the power supply cables, all other armoured conduit fittings can be used as desired.

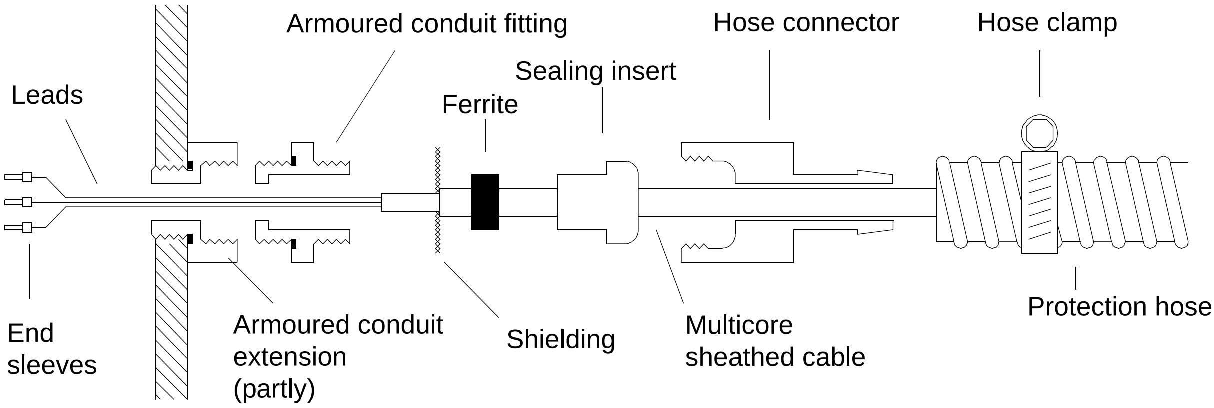
Avoid the crossing of cables!
Select always the connection closest to the detection module.
The power supply cable must be fed through the armoured conduit fitting 9 at the far left.

The large armoured conduit fittings 13.5 are provided for the connection of detection modules which are mounted to measuring bridges, the rejector and the machine detection modules. The smaller armoured conduit fittings 9 are available for all remaining applications.

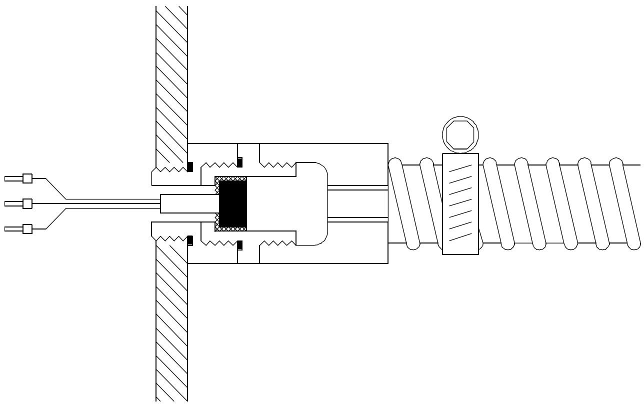
Mounting of an armoured conduit fitting

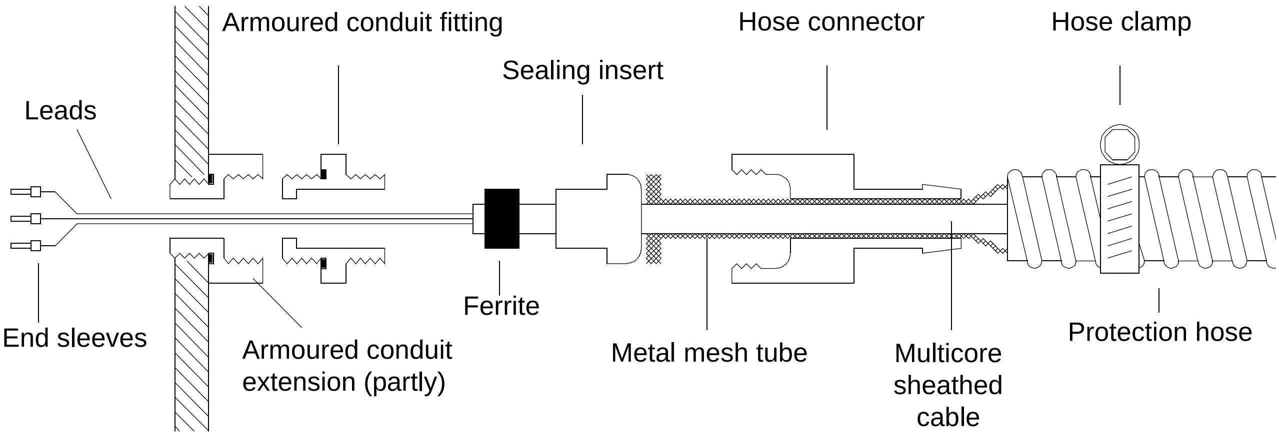
All armoured conduit fittings must be mounted as illustrated below or on the following page. Pay attention to the two available variants which differ by the type and the connection of the shielding.

Tighten the screws of the armoured conduit fittings as they were premounted. Pay special attention to the sealing and the connection of the shielding. The connection of the shielding is required in order to adhere to the EMC-directives (electromagnetic compatibility).

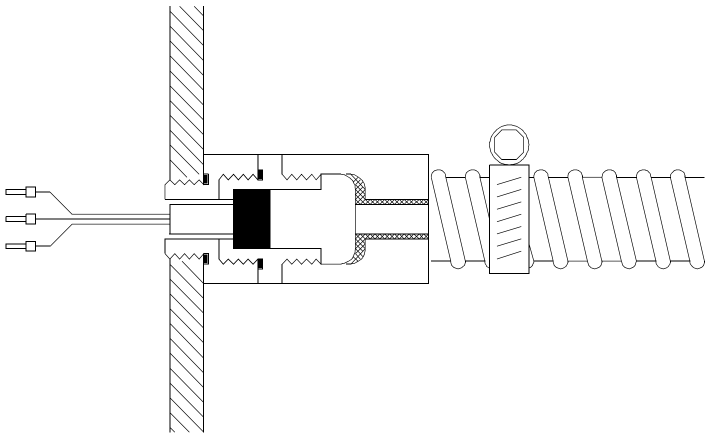


Armoured conduit fitting
Hose connector
Hose clamp
Sealing insert
Leads
Ferrite
End sleeves
Armoured conduit extension (partly)
Shielding
Multicore sheathed cable
Protection hose





Armoured conduit fitting
Hose connector
Hose clamp
Sealing insert
Leads
End sleeves
Ferrite
Armoured conduit extension (partly)
Metal mesh tube
Multicore sheathed cable
Protection hose



Dummy plugs

When the device is delivered, cable inserts are closed with armoured conduit dummy plugs of size 9 or 13.5. An armoured conduit fitting is mounted for the mains supply. Some of the dummy plugs must be removed for the connection of detection modules. They are replaced by the armoured conduit fittings delivered with a detection module. Keep the remaining dummy plugs to close the bore holes in case of possible retrofittings or when dismounting a module for repair.

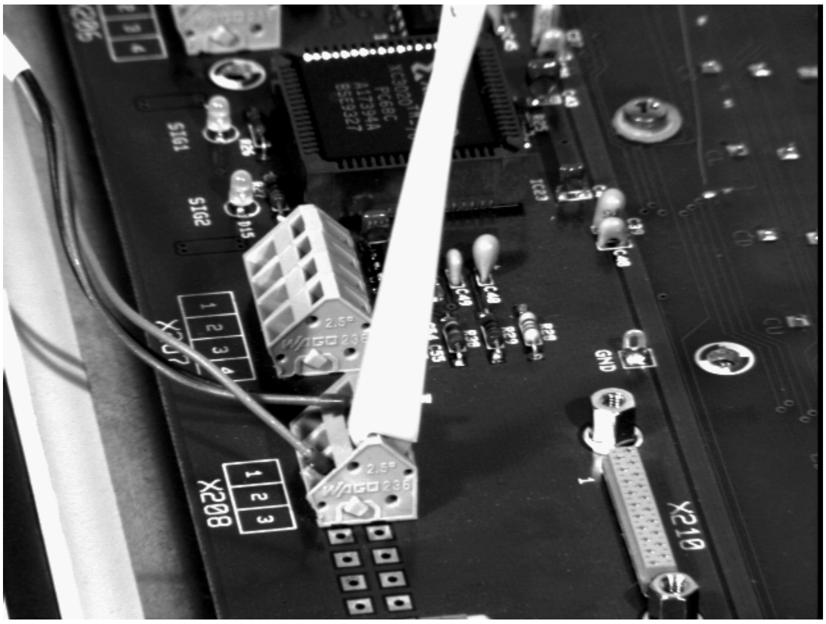
Humidity will cause damage to the electronic system.
Close all bore holes with dummy plugs or armoured conduit fittings.

During mounting, all armoured conduit fittings and dummy plugs must be inserted with a packing ring (O-ring).

Terminals

Connection of cable leads

1. Place the lever (special tool, delivered with the device) to the corresponding terminal from above.
2. Press the contact spring of the terminal to the open position.
3. Insert the cable lead into the terminal.
4. Remove the special tool.
5. Pull gently on the cable to check the correct connection.



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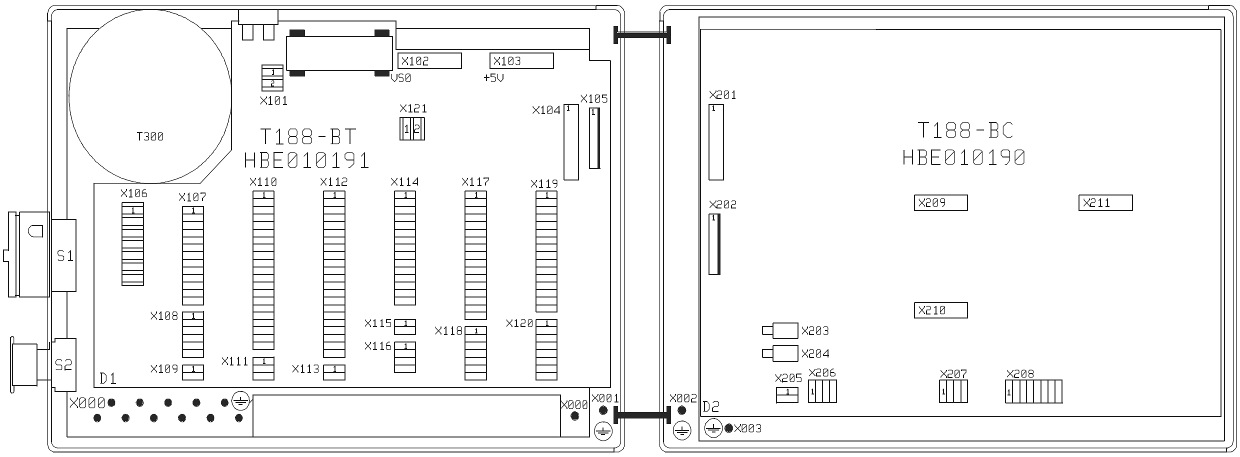
Terminal designations

The designation of the terminals permits to define the position of a terminal. The first digit indicates the position of the terminal strip:

X000 ... X003	Casing
X101 ... X120	*basic* terminal card T188-BT/ST or /ST2
X201 ... X211	*basic* CPU card T188-BC/ST
X300	External terminal box at the filler or labeller
X400 ... X401	External terminal box

The terminals of a terminal strip are either numbered from left to right or from top to bottom. The position of terminal 1 is on top at the left.

For a better orientation, the terminal numbers and the designations of the terminal strips are printed on the printed circuit boards.



Cable designation

The delivered cables are provided with cable designations. These designations must not be removed.

Every cable designation consists of
- the letter W,
- a 3-digit or 4-digit number.

In case of a 3-digit number, the first digit indicates the reference page in the wiring diagram where the cable is mentioned.
The last two digits represent a continuous cable number.
In case of a 4-digit number, the first two digits provide the reference to the wiring diagram.

In order to distinguish between individual leads, a colour designation is added to the designation. The colour code represents the following colours:

wh	white	**bn**	brown	**gn**	green	**ye**	yellow	**gr**	grey
pi	pink	**bl**	blue	**re**	red	**bk**	black	**vi**	violet

Multicoloured leads have a colour code derived from the above colours e.g.: gn/ye for the colour green-yellow

W405-bn: brown lead of cable no. 5 on page 4 of the wiring diagrams

Designation of operating material

All sensors to be connected are provided with operating material designations. These designations must not be removed.

Every sensor has a designation consisting of
the letter B and
a 3-digit or 4-digit number.

In case of a 3-digit number, the first digit indicates the reference page in the wiring diagram where the cable is mentioned.
The last two digits represent the continuous number of the operating material.
In case of a 4-digit number, the first two digits provide the reference to the wiring diagram.

B401: photocell, shown on page 4 of the wiring diagrams

Further proceedings

In case of an initial installation, the following connections must be made one after the other:

» Main power supply
» Measuring bridges for detection modules (optional)
» Machine detection modules (optional)
» Rejector (optional)
» Encoders
» Triggers
» Warning light (optional)
» Connection of external count signals (optional)

In case of retrofitting the device, the procedure is equal to the installation instructions for an initial installation.

Danger of electric shock!
Prior to starting installation work cut the voltage of the mains power supply according to DIN VDE 0105. When interrupting the installation work, recheck the dead voltage condition of the mains power supply cable before resuming work.

When working on the device, stop the conveyor and lock them it to prevent inadvertent switch-on!

Main power supply

Standard device

An electrician only is authorised to connect the mains power supply according to DIN VDE 0105.

Disconnect the voltage of the mains supply cable

1. Cut the voltage of the mains supply cable.

2. Lock it out to prevent inadvertent switch-on,
   e.g. by removing the circuit breakers or attaching a prohibitive sign.

3. Check that the dead voltage condition,
   e.g. with a voltmeter.

When working at locations with mains voltage, the mains power supply cable must be in the dead voltage condition.

Connection of the mains supply cable

Cut the voltage of the mains supply cable!

For the connection use only shielded cables, 3x1.5 mm^2, oilproof and flexible such as for example

LAPP 0035008 (ÖLFLEX-100CY)
HPM ÖPVC-J-CY 3x1.5

1. Embed the 3-core power supply cable leading to the device in a protection hose.

2. Cut the cable, the required length after the inserting position of the device is 150 mm.

3. Slide hose clamp, hose connector, sealing insert, ferrit core and armoured conduit extension over the cable.

4. Peel off the insulation at the cable end for a length of 140 mm.

5. Remove the shielding and the inner sheathing for a length of 130 mm.

6. Provide the cores L1 and N each with an end sleeve.

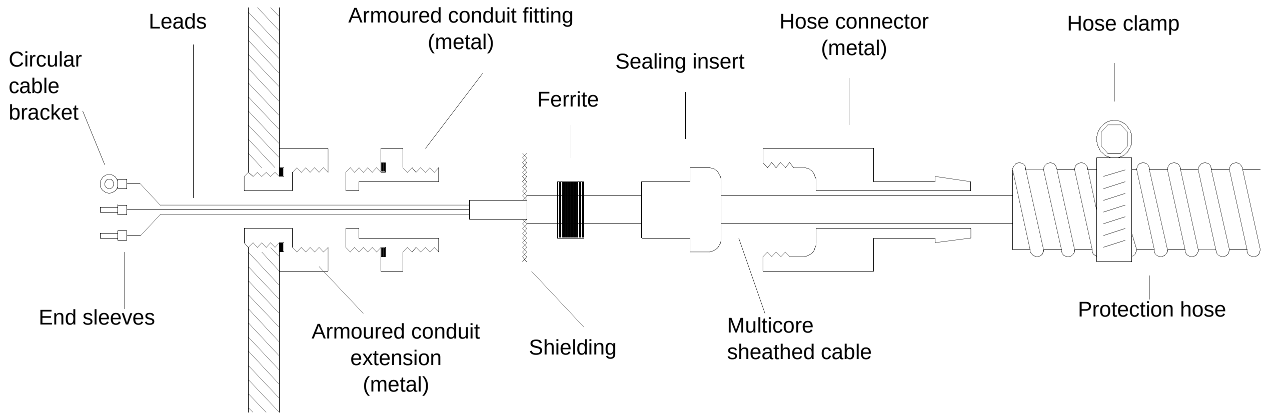
7. Press the circular cable bracket for an M4 screw to the PE-core.

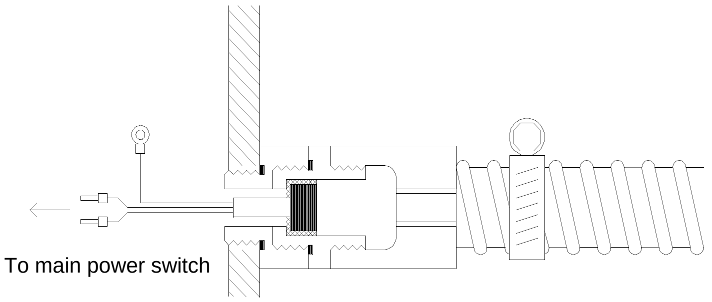
8. Loosen the 4 hexagon socket screws of the front panel, open the front panel and remove the dummy plug from the armoured conduit fitting at the extreme left.

9. Pull the cable from the lower side of the device through the armoured conduit fittings 9 at the extreme left.

10. Mount the armoured conduit fitting according to the drawing. Connect the shielding in the armoured conduit fitting by using the ferric core (when delivered, the ferric core is attached inside the armoured conduit fitting).

Pay attention that the tightness of the screw connection is ensured.





11. Screw the PE-core with one of the M4 recessed head screws to the left side of the bottom plate.

12. Connect the L1 core to terminal 2 of the main power switch (brown lead).

13. Connect the N core to terminal 4 of the main power switch (blue lead).

14. Set the voltage select switch S1 on the Terminal-card to the local mains voltage.

   - during factory assembly this switch has been set to 230 V,
   - check the voltage of the mains supply before switching the device to 115 V,
   - the switch is secured with a transparent sticker.

Excessive input voltage will cause damage to the device.

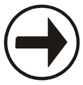
15. Switch on the mains supply voltage

16. switch on the main power switch,

   - the green LEDs (VDC, VEX and +5 V) on the CPU card are on.

EPROM insertion

The operating program of the device is stored in a programmed memory module (EPROM). The EPROM is packaged in a plastic bag and protected against static charges by conductive foam material.



The EPROM is a module sensitive against electrostatic charging.
Do not remove the EPROM from its packaging until immediately prior insertion.
Touch earthed metal parts for personal discharging (e.g. the device casing) prior to touching the connectors.

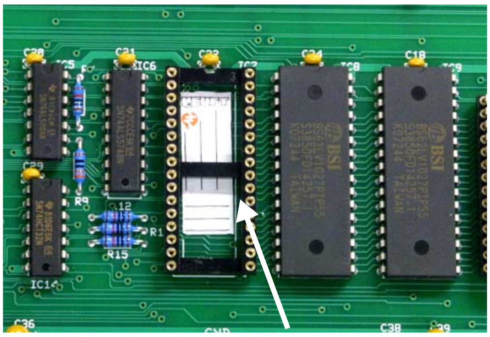
1. Switch off the main power switch.

2. Carry out personal discharging (e.g. by touching the metal bottom plate in the casing).

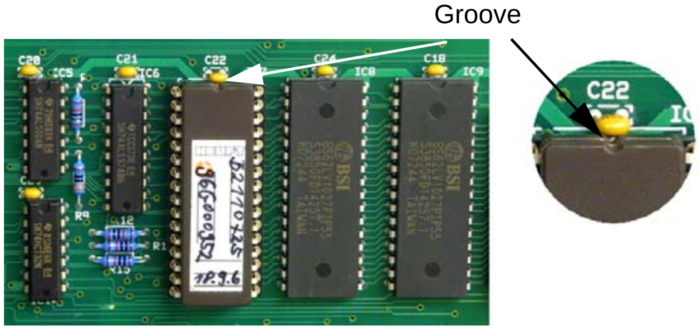
3. Unpack the EPROM from its anti-static packaging.

4. Check that none of the connectors is bent and that they are all rectangular to the casing,
   - correct bent connectors with small pointed pliers.

5. Insert the EPROM in the vacant base IC8 on the CPU card,
   - the groove at the narrow part of the EPROM must point upwards.

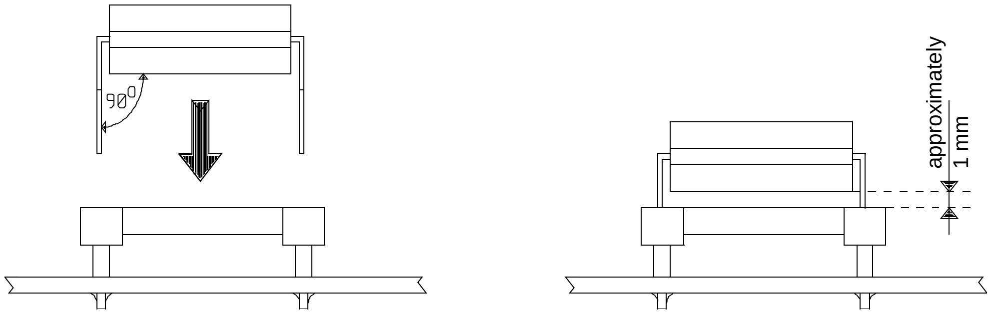


EPROM base

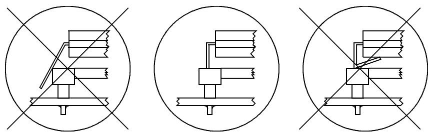


EPROM correctly inserted

6. Slowly press the EPROM into the base,
   - all connectors remain in the base,
   - the distance between base and EPROM is 1 mm.



7. Check to prevent EPROM damage or destruction when the device is switched on,
   - EPROM is inserted in the base with the groove pointing upwards,
   - all connectors are in the base,
   - EPROM sits tightly in the base (distance between base and EPROM is 1 mm)



8. Switch on the main power switch.

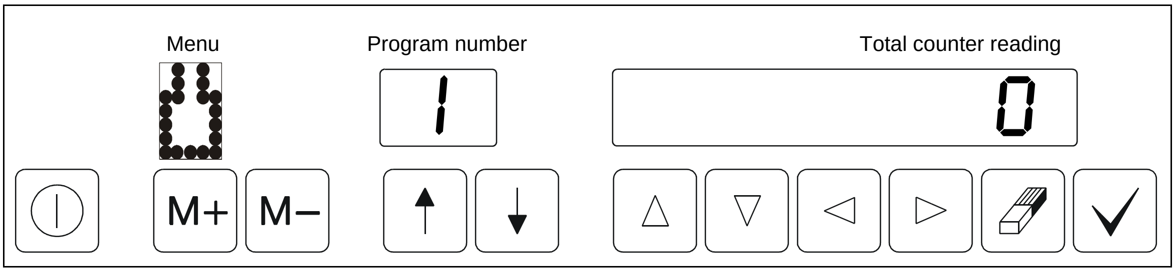
RB *basic* V8.00

9. All LEDs on the front panel are on,
   - readable characters appear in the digital display after 1 second.

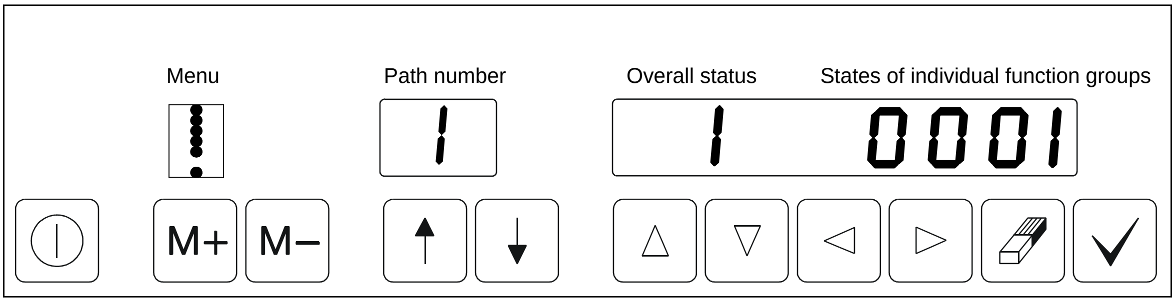
If there are no readable characters, switch off the device immediately! Recheck the EPROM.

When "DEFAULT" is displayed, the standard data (default values) are loaded into the memory and the entire EEPROM data area is provided with preempt data. In the loading phase, the device must not be switched off with the main power switch.

"DEFAULT" remains displayed for some seconds, then appears a counter display counting upwards at different speeds depending on the stage of the data check.
The following display appears after the completion of a correct loading phase:



When a fault is detected during the loading phase, data loading will terminate with the respective fault message. Correct the fault according to the instructions valid for this message (⇒ Messages, page 351).



Measuring bridges for detection modules

Closure detection (BA)

The individual closure detection sensors are installed on a measuring bridge. Depending on the device equipment, not all of the sensors are available. The connection cables are provided with a 13.5 armoured conduit fitting.

1. Switch off the device with the main power switch.

2. Mount the cable in the 13.5 armoured conduit fitting (⇒ Mounting of an armoured conduit fitting, page 172).
   It may be possible that several single cables must be led through the packing insert.

Inductive, bottles (optional)

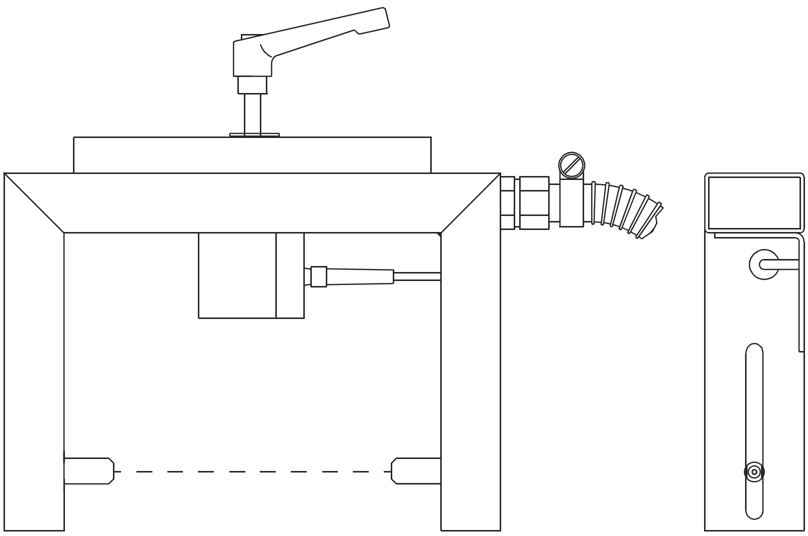
3. Connect the cable W801 with the terminal strip X110 on the terminal card in accordance with the wiring diagram:

The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - the green LED must be on at sensor B801,
   - place metal (e.g. a closure) 10 mm below the sensor.
   - yellow and green LEDs on the sensor come on,
   - at the same time the green LED LD21 (beside the terminal strip X110) comes on.

Measures in case of malfunctions:
- check the connections,
- replace the sensor.

5. Sensor adjustment,
   - adjust the height with the vertical adjustment device of the measuring bridge,
     the distance between the lower side of the sensor and the closure is 15 to 20 mm.



Inductive, cans (optional)

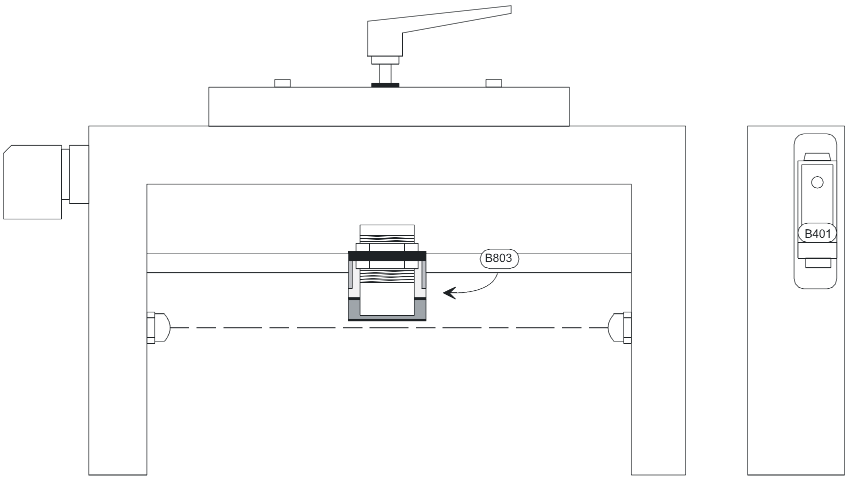
3. Connect the cable W803 with the terminal strip X113 on the terminal card in accordance with the wiring diagram:

The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - the green LED LD39 (beside terminal strip X113) comes on,
   - hold metal (e.g. can) at a distance of 5 mm below the sensor,
   - LD39 goes out.

Measures in case of malfunctions:
- check the connections,
- replace the sensor.

5. Sensor adjustment,
   - adjust the height with the vertical adjustment device of the measuring bridge, the distance between the lower side of the sensor and the can lid is 5 mm.



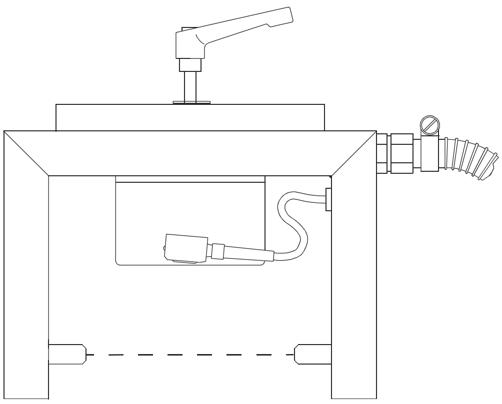
3. Connect the cable W800 with the terminal strip X110 on the terminal card in accordance with the wiring diagram:

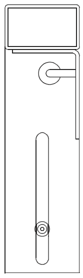
The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - hold the hand at a distance of 10 mm below the sensor,
   - the red LED of the sensor comes on,
   - at the same time the green LED LD21 (beside the terminal strip X110) comes on.

Measures in case of malfunctions:
- check the connections,
- clean the photocell,
- replace the photocell.

Adjusting the sensor





Rotary potentiometer

The intensity of the sensor is adjusted using a rotary potentiometer. For this purpose the container with the darkest-coloured closure has to be selected from the range of products which are filled along this line. In the case of a dark closure the light beam of the sensor is reflected less.

The determined setting is valid for all the other containers from the range of products which are filled along this line.

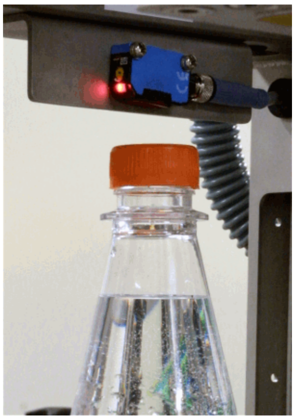
5. Stop the conveyor.

6. Place a container with a dark closure centrally under the detection.

7. Adjust the height of the measuring bridge using the vertical adjustment device in such a way that the sensor is about 20 mm above the closure of the container.

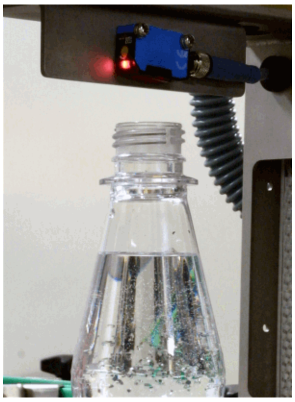
8. Shift the measuring bridge with the horizontal adjustment device until the sensor is placed exactly centrally above the container closure.

9. Adjust the intensity of the sensor with a suitable screwdriver at the potentiometer in such a way that the orange indicator LED lights up.



10. Make a note of the rotary potentiometer position.

11. Remove the test container from the conveyor and place an **open** container filled with a product (e.g. beer, milk, juice) centrally under the sensor. A beer bottle can also be shaken if the container liquid foams a great deal (e.g. in the case of beer) during the check with the optical sensor.



12. Increase the intensity of the sensor until the orange indicator LED on the sensor lights up. Set to the maximum intensity if the indicator LED does not light up. Make a note of the rotary potentiometer position.

13. Set the average of the values noted in numbers 10 and 12 at the rotary potentiometer.

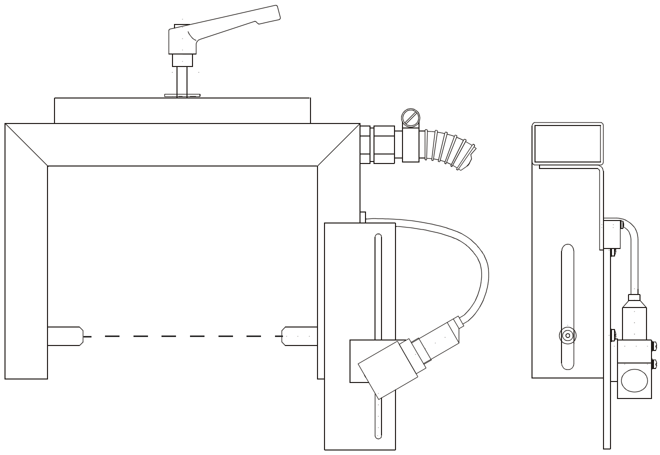
Foil (optional):

3. Connect the cable W804 with the terminal strip X114 on the terminal card in accordance with the wiring diagram.

The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - the green LED of the photocell comes on,
   - the LED LD44 (beside the terminal strip X114) is off,
   - hold a piece of white paper at a distance of 50 mm in front of the photocell,
   - the red LED of the sensor comes on,
   - at the same time the green LED LD44 comes on.

Measures in case of malfunctions:
- check the connections,
- clean the photocell,
- replace the photocell.



5. Vertical adjustment of the measuring bridge,
   - containers pass through the centre of the bridge with some centimeters as safety distance,
   - the light beam of the foil photocells hits the foil at an angle of 30°,
     - for this purpose loosen both recessed head screws in the guidance of the support,
     - shift the photocell,
     - tighten the recessed head screws again,
     - loosen the recessed head screws on the photocell from the mounting plate,
     - change the tilt angle by screwing the photocells to different threaded holes,
     - tighten the recessed head screws again.

6. Setting the sensitivity of a photocell,
   - have a container with the darkest foil and a container without a foil available,
   - place a container with foil below the measuring bridge so that the light beam hits the foil in the middle,
     - use a small blade screw driver to turn the setting screw in clockwise direction
     - until the red and the green LED of the photocell come on,
     - turn the regulator in clockwise direction by one more dash of the scale,
     - replace the container by the one without a foil,
     - the red LED must be off,
     - the green LED must be on,
   - tighten all attachment screws.

Excessive height (optional)

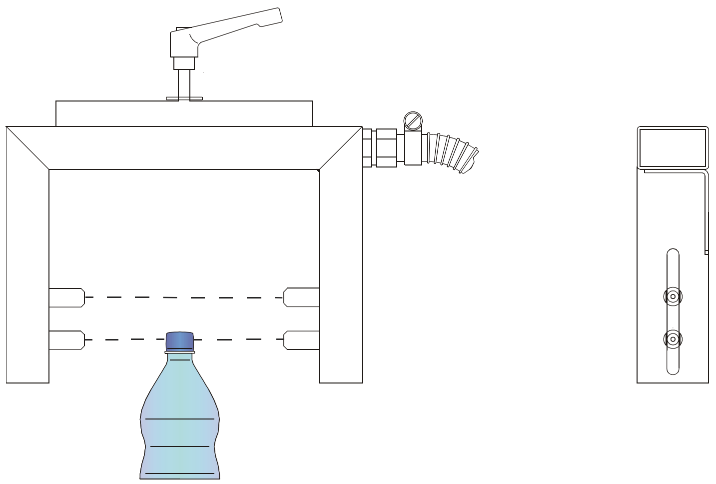
3. Connect the cable W802 with the terminal strip X110 on the terminal card in accordance with the wiring diagram.

The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - the lens on the transmitter side of the photocell shows a red light,
   - the red and the green LED at the photocell are on,
   - the green DEL LD22 on the terminal card (beside terminal strip X110) is on,
   - interrupt the photocell with a hand,
   - the red LED of the photocell and the green LED LD22 of the terminal card go out.

Measures in case of malfunctions:
- check the connections,
- clean the photocell,
- replace the photocell.

5. Photocell adjustment,
   - adjust the height with the vertical adjustment device of the measuring bridge, the light beam must not be interrupted by the closure of the container.



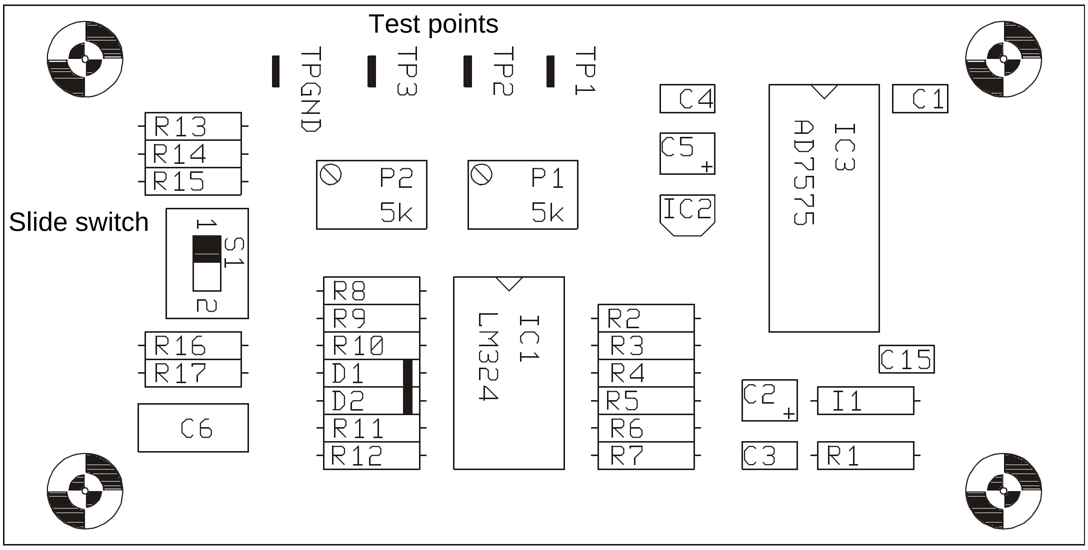
Do not change the lens supports,
The sensitivity has been set during factory assembly.

Pressure (optional)

3. Insert the AD converter card (HBE010195) as an extension card into the CPU card,
   - place the card to the connector strips X209 and X210, the switch must point towards the terminal strip X208,
   - attach the card with 4 screws M3 x 6 and washers,
   - place the slide switch on the AD converter card in position 2.

Do not change the potentiometer!
The AD converter card was compensated and sealed during factory assembly.

4. Connect the cable W805 with the terminal strip X208 on the CPU card in accordance with the wiring diagram.



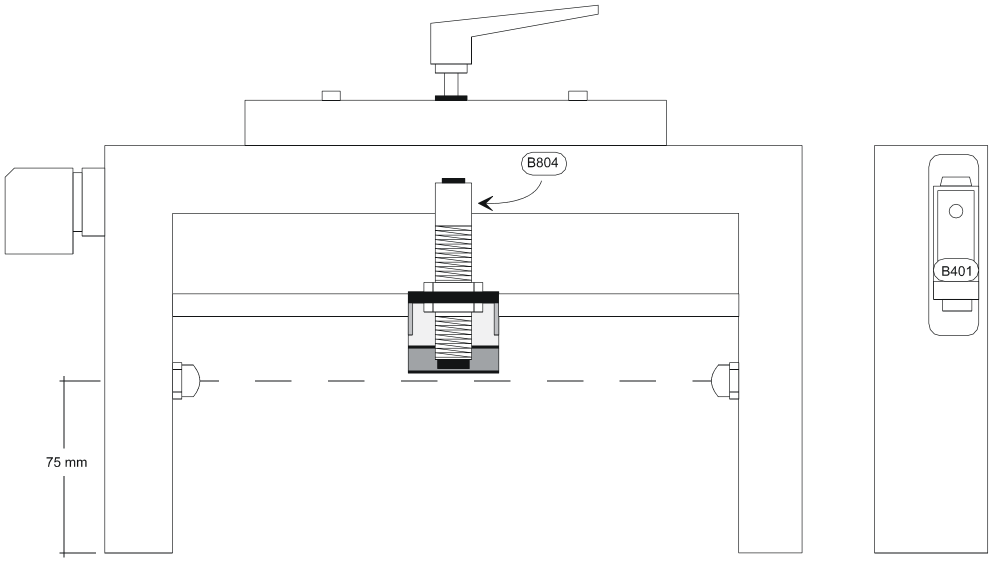
Plan of parts T188-AD

The function check requires device switch-on.
The safety regulations must be observed!

5. Function check,
   - set the multimeter for the measuring range of 3 V,
   - connect it between the test points TP2 and TPGND of the AD converter card,
   - switch on the main power switch,
   - the multimeter displays a value of 2 to 3 V,
   - place metal (e.g. a closure) 1 mm below the sensor.
   - the multimeter displays a value of less than 1 V,
   - switch-off the main power switch,
   - disconnect the multimeter.

Measures in case of malfunctions:
- check the connections,
- check the switch setting on the AD converter card,
- check the correct position of the AD converter card,
- replace the sensor,
- replace the AD converter card.

6. Sensor adjustment,
   - check whether the sensor is aligned parallel to the closure,
     if not: Loosen the setting screw, align the sensor and tighten again the setting screw,
   - adjust the height with the vertical adjustment device of the measuring bridge,
     so that the distance between the lower side of the sensor and the closure is 2 to 4 mm.



HEUFT *sonic* (optional)

The driver card T186-DRRV is installed in a terminal box which is mounted below the control unit.

3. Connect the cable W1417 of the magnet in the measuring bridge to the driver card T186-DRRV according to the wiring diagram.

4. Connect the cable W1418 of the magnet in the measuring bridge to the driver card according to the wiring diagram.

5. Connect the cable W1410 from the driver card to the terminal strip X208 on the CPU card according to the wiring diagram.

6. Connect the cables W1408 and W1409 from the driver card to the terminal strip X208 on the CPU card according to the wiring diagram.

7. Connect the cable W1411 with Cynch connectors to the terminal strip X1401 in the terminal box according to the wiring diagram.

8. Remove the *sonic* card and connect the cable W1413 with Cynch connectors from the terminal strip in the terminal box to the *basic sonic* card at socket MTC according to the wiring diagram. Thereafter, place again the *sonic* card to the connector strips X209 and X210.

9. Use the cables W1400 and W1401 to connect the CPU card with the terminal card in accordance with the wiring diagram.

10. Vertical adjustment of the measuring bridge
    - switch-off the conveyor,
    - put a container centred below the sensor,
    - align the sensor vertically so that the sensor surface is aligned in parallel to the closure,
    - adjust the height of the measuring bridge so that the distance between sensor and closure is 3.0 +/-0.5 mm.
    - write down the value read at the scale for the purpose of brand changes.

In case of a brand change readjust the height as precisely as possible. It is reasonable to adjust the height exactly to a dash of the scale and to set the vertical adjustment device to this dash from above in case of every brand change.
The measured values depend on the distance between a closure and the sensor.

In case of devices equipped with the closure detection *sonic*, the main trigger must be installed via the terminal strip in the terminal box of the driver card ⇒ Main trigger as 1st trigger at the standard device, page 231.

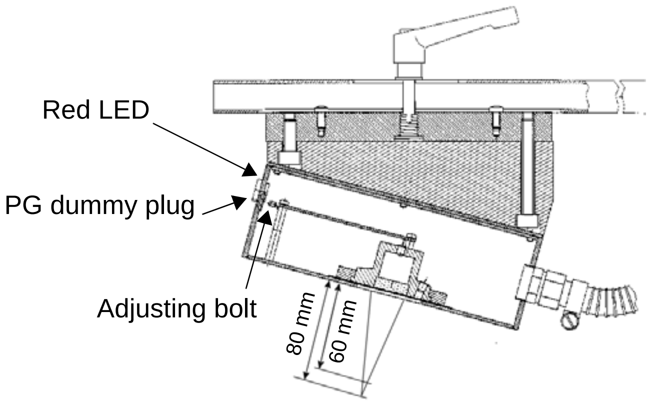
Closure detection (VF)

Optical, empties (optional)

3. Connect the cable W800 with the terminal strip X110 on the terminal card in accordance with the wiring diagram:

The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - hold the hand at a distance of 10 mm below the sensor,
   - the red LED within the sensor casing comes on,
   - at the same time the green LED LD21 (beside the terminal strip X110) comes on.



Measures in case of malfunctions:
- check the connections,
- clean the sensors.

5. Sensor check,
   - adjust the height with the vertical adjustment device of the measuring bridge,
     distance between lower side of the sensor and a closure is 60 to 80 mm (⇒ drawing above),
     put a container **with** a closure below the sensor,
     the red LED must be on,
     put a container **without** a closure below the sensor,
     the red LED must be **off**,

   - Set the sensor sensitivity if required,
     - remove the PG dummy plug,
     - shift a container without a closure through the measuring bridge,
     - simultaneously turn the setting screw of the potentiometer in clockwise direction until the red LED of the sensor shortly comes on,
     - turn the setting screw in anti-clockwise direction until the LED of the sensor does not come on reliably when the container passes underneath the sensor,
     - turn the screw for one quarter rotation in anti-clockwise direction,
     - shift a container with a closure below the measuring bridge,
     - the red LED of the sensor must shortly come on,
     - insert again the PG dummy plug.

Fill level detection (BA)

For the fill level detection either the HF measuring bridge, up to two Gamma measuring bridges, up to two X-ray measuring bridges or up to two infrared measuring bridges are mounted. The connection cables are provided with a 13.5 armoured conduit fitting.

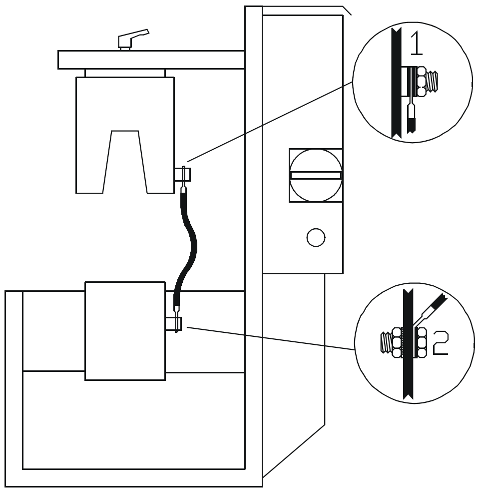
1. Switch off the device with the main power switch.

2. Mount the cable in the 13.5 armoured conduit fitting (⇒ Mounting of an armoured conduit fitting, page 172).
   Several single cables can be fed through the sealing screw.
   For the HF bridge the earth cable W606 must not be fed through the armoured conduit fitting.

HF measuring bridge (optional)

3. 2 connection cables, W603 and W604,
   2 connection cables with plug, W601 and W602 for the connection to the CPU card in accordance with the wiring diagram.

4. For measuring bridge variant KT only:
   connect the earth cable W606 below the measuring bridge to the conveyor side frame (metal),
   - Stop the conveyor and lock it out to prevent inadvertent switch-on!
   - Determine the appropriate thread in the conveyor side frame or
     - drill a bore hole of 8.5 mm in the metal conveyor side frame,
     - connect the earth cable with an M8 screw,
       (secure with spring washer, washers and tooth lock washer from loosening).



The function check requires device switch-on.
The safety regulations must be observed!

5. Function check,
   - switch on the main power switch,
   - the green LED VEX (above the flat cable connection) on the terminal card is on,
   - the yellow LED SIG1 on the CPU card is on.

Measures in case of malfunctions:
- check the connections,
- check the plugged connection,
- replace the measuring bridge.

RB *basic* V8.00

Gamma measuring bridge (optional)

A radioactive radiation source is used for the operation of the Gamma measuring bridge. The corresponding mounting and shipping regulations are subject to different national regulations, additionally, most countries require a special approval by the competent governmental authorities for the operation of such a device. The required authorisations must be available prior the mounting and commissioning of a measuring bridge.

Radioactivity!
Do not put your hands in the radiation area! After the installation, DO NOT put your hands in the radiation area unless the green light is on (shutter is closed). The orange light (in GB: red) is out in this case. ONLY persons trained and licensed by HEUFT Company for repair of radioactive devices are authorised to open the measuring bridge.

If desired, especially trained HEUFT service personnel will carry out installation.

Special care is required for the installation and the test of the shutter monitoring circuit (closing of the radiation window)!

3. The following is necessary when using two Gamma measuring bridges:
   change the cable designation on the Gamma measuring bridge for overfill checks,
   - mark cable W703 as W703* and
   - mark cable W605 as W605*,
   - remove the previous cable designations,
   - remove the bridge between the terminals X120.3 and X120.4 on the terminal card.

4. For the application of one Gamma measuring bridge,
   - Bridge the terminals X120.3 and X120.4 on the terminal card.

5. Gamma measuring bridge underfill (UF)
   - Connect the cable W605 with the terminal strip X206 on the CPU card in accordance with the wiring diagram.

   - Connect the cable W703 with the terminal strip X120 on the terminal card in accordance with the wiring diagram.

6. Gamma measuring bridge overfill (OF)
   - Connect the cable W605* with the terminal strip X207 on the CPU card in accordance with the wiring diagram.

   - Connect the cable W703* with the terminal strip X120 on the terminal card in accordance with the wiring diagram.

Gamma or X-ray warning light (optional)

The warning light which displays the status of the radiation window is attached to the device. The green light indicates that the radiation window is closed, the orange light (in GB: red) indicates the open condition.

7. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

8. Connect the cable W702 of the warning light to the terminal strip X118 on the terminal card in accordance with the wiring diagram.

Shutter switches (optional)

According to the applicable safety regulations, either one or two switches are installed to close the radiation window (shutter). German regulations prescribe the installation of two shutter switches.

9. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

10. In the case of **two** shutter switches:
    1. Shutter switches
    - Connect the cable W701 with the terminal strip X118 on the terminal card in accordance with the wiring diagram.

    2. Shutter switches
    - Connect the cable W701 with the terminal strip X118 on the terminal card in accordance with the wiring diagram.

Use X112.22 if X118.H is not available for W701-wh.

11. In the case of **one** shutter switch:
    - Connect the cable W701 with the terminal strip X118 on the terminal card in accordance with the wiring diagram.

The function check requires device switch-on.
Adhere to the safety regulations!
Turn both shutter switches to position 0 (closed, OFF).

12. Function check,

- switch on the main power switch,
- turn both shutter switches to OFF ("0"),
- the green LED VEX (above the flat cable connection) on the terminal card is on,
- the green warning light is on, the orange warning light (in GB: red) is off,
- the green LEDs LD73 and LD74 (beside terminal strip X120) on the terminal card are on,
- turn one of the shutter switches to ON,
- the status of the warning light and the LEDs must not change,
- turn the shutter switch to OFF,
- turn the second shutter switch to ON,
- the status of the warning light and the LEDs must not change,
- turn both shutter switches to ON,
- the orange warning light (in GB: red) is on, the green warning light goes out,
- when **one** Gamma or X-ray measuring bridge is used
    - the LED LD 73 is on, LD74 is off, the yellow LED SIG1 on the CPU card is on,
- when **two** Gamma or X-ray measuring bridges are used
    - LEDs LD73 and LD74 are off, the yellow LEDs SIG1 and SIG2 on the CPU card are on.

Measures in case of malfunctions:
- check the connections,
- check the bridge between the terminals X120.3 and X120.4,
- check the light bulbs of the warning lights E4 and E5,
- replace the measuring bridge.

For safety reasons, the orange warning light (in GB: red) is subject to monitoring. The shutter will not open when there is an interruption of the electrical circuit.

X-ray measuring bridge (optional)

An X-radiation source is used to operate the X-ray measuring bridge. The corresponding mounting and shipping regulations are subject to different national regulations, additionally, most countries require a special approval by the competent governmental authorities for the operation of such a device. The required authorisations must be available prior the mounting and commissioning of a measuring bridge.

X-radiation!
Do not put your hands in the radiation area! After the installation, DO NOT put your hands in the radiation area unless the green light is on (shutter is closed). The orange light (in GB: red) is out in this case. ONLY persons trained and licensed by HEUFT Company for the repair of x-raying devices are authorised to open the measuring bridge on the emitter side.

If desired, especially trained HEUFT service personnel will carry out the mounting and installation.

Special care is required for the installation and the test of the shutter monitoring circuit (closing of the radiation window)!

3. The following is necessary when using two X-ray measuring bridges:
   change the cable designation on the X-ray measuring bridge for **overfill checks**,
   - mark cable W703 as W703* and
   - mark cable W605 as W605*,
   - remove the previous cable designations,
   - remove the bridge between the terminals X120.3 and X120.4 on the terminal card.

4. The following is necessary when using one X-ray measuring bridge:
   - bridge the terminals X120.3 and X120.4 on the terminal card.

Receiver

5. X-ray measuring bridge for underfill checks (UF)

   - Connect the cable W605 with the terminal strip X206 on the CPU card in accordance with the wiring diagram.

6. X-ray measuring bridge for overfill checks (OF)

   - Connect the cable W605* with the terminal strip X206 on the CPU card in accordance with the wiring diagram.

X-ray generator

7. The following is necessary when using two X-ray measuring bridges:
   change the cable designation on the X-ray measuring bridge for **overfill checks**,
   - mark cable W705 as W705*,
   - remove the previous cable designation.

8. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

9. X-ray generator for underfill checks (UF)

   - Connect the cable W705 of the X-ray generator to terminal strip X110 on the terminal card in accordance with the wiring diagram.

   - Connect the cable W703 with the terminal strip X120 on the terminal card in accordance with the wiring diagram.

10. X-ray generator for overfill checks (OF)

- Connect the cable W705* of the X-ray generator to terminal strip X114 on the terminal card in accordance with the wiring diagram.

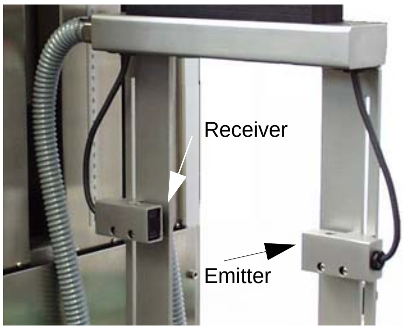
- Connect the cable W703* with the terminal strip X120 on the terminal card in accordance with the wiring diagram.

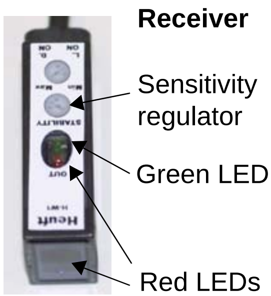
Installation of the **X-ray warning light** and the **shutter switches**
⇒ Gamma or X-ray warning light (optional), page 196

Infrared measuring bridge

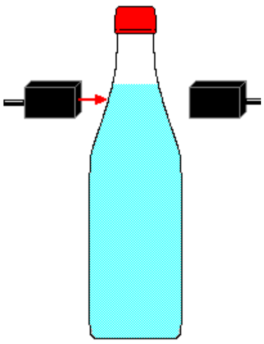
Infrared measuring bridge underfill (UF) (optional)

3. Connect the cables W710 and W711 to the terminal strip X110 on the terminal card in accordance with the wiring diagram.
4. Function check
   - » Stop the conveyor and lock it out to prevent inadvertent switch-on!
   - » Switch on the main power switch of the device.
   - » **Do not** place a container below the measuring bridge.





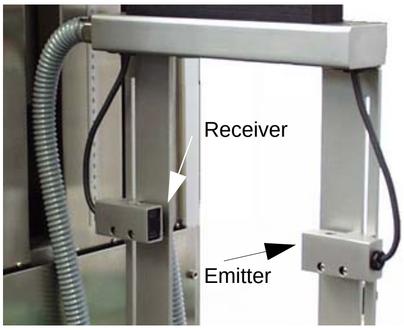
- • On the photocell emitter the red LED comes on (functional indicator).
- • The green LED (stability indicator) must always be on at the photocell receiver.
- » Turn the sensitivity regulator anticlockwise to minimum.
  The red LED must **not** be on when the regulator is set to minimum. If it is on nonetheless, the switch below the regulator is in the position "D. ON". Dismount the photocell receiver and turn the switch anticlockwise to "L. ON".
- » Place an empty container below the measuring bridge in such a way that the light beam shines through the empty neck.
- » Turn the sensitivity regulator clockwise until the red LED comes on.
- » Mark the position of the regulator.
- • On the terminal card the green light-emitting diode LD26 (beside the terminal strip X110) is on.
- » Place a filled container below the measuring bridge in such a way that the light beam is interrupted by the liquid in the neck area.



- • The red LED of the photocell receiver (also on the sensor’s front) and the green LED of the terminal card will go out.
- » Keep on turning the regulator clockwise until the red LED comes on. If the red LED does not even come on when the regulator is at the maximum position, the ”maximum” setting is applicable as regulator position.
- » Mark the position of the regulator.
- » Turn the setting screw to the centre between the two marks.

Infrared measuring bridge overfill (OF) (optional)

3. Connect the cables W720 and W721 to the terminal strips X107 and X114 on the terminal card in accordance with the wiring diagram.
4. Function check
   » Stop the conveyor and lock it out to prevent inadvertent switch-on!
   » Switch on the main power switch of the device.



- On the photocell emitter the red LED comes on (functional indicator).
- The green LED (stability indicator) must always be on at the photocell receiver.

» Turn the sensitivity regulator anticlockwise to minimum.
The red LED must **not** be on when the regulator is set to minimum. If it is on nonetheless, the switch below the regulator is in the position "D. ON". Dismount the photocell receiver and turn the switch anticlockwise to "L. ON".

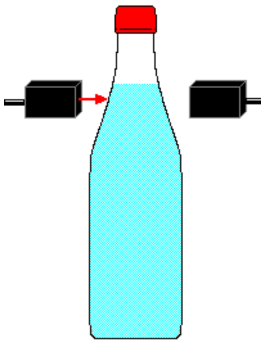
» Place an empty container below the measuring bridge in such a way that the light beam shines through the empty neck.

» Turn the sensitivity regulator clockwise until the red LED comes on.

» Mark the position of the regulator.

- On the terminal card the green light-emitting diode LD7 (beside the terminal strip X107) is on.

» Place a filled container below the measuring bridge in such a way that the light beam is interrupted by the liquid in the neck area.



- The red LED of the photocell receiver (also on the sensor’s front) and the green LED of the terminal card will go out.

» Keep on turning the regulator clockwise until the red LED comes on. If the red LED does not even come on when the regulator is at the maximum position, the ”maximum” setting is applicable as regulator position.

» Mark the position of the regulator.

» Turn the setting screw to the centre between the two marks.

Residual Liquid Detection (VF)

For the detection of residual liquid, either a Gamma measuring bridge is mounted to the device or two measuring heads for the HF-system are mounted to the conveyor guide rails. The connection cables are provided with a 13.5 armoured conduit fitting. The HF detection module requires two connection cables.

1. Switch off the device with the main power switch.

2. Mount the cable in the 13.5 armoured conduit fitting (⇒ Mounting of an armoured conduit fitting, page 172).
   Several single cables can be fed through the sealing screw.
   For the HF bridge the earth cable W606 must not be fed through the armoured conduit fitting.

Measuring heads of the residual liquid detection HF (optional)

3. Connect the cable W606 with the terminal strip X208 on the CPU card in accordance with the wiring diagram.

The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - the green LED VEX (above the flat cable connection) on the terminal card is on.

Measures in case of malfunctions:
- check the connections,
- check the plugged connection,
- replace the measuring heads.

Measuring bridge of residual liquid detection Gamma (optional)

A radioactive radiation source is used for the Gamma measuring bridge function. The corresponding mounting and shipping regulations are subject to different national regulations, additionally, most countries require a special approval by the competent governmental authorities for the operation of such a device. The required authorisations must be available prior the mounting and commissioning of a measuring bridge.

Radioactivity!
Do not put your hands in the radiation area! After the installation, DO NOT put your hands in the radiation area unless the green light is on (shutter is closed). The orange light (in GB: red) is out in this case. ONLY persons trained and licensed by HEUFT Company for repair of radioactive devices are authorised to open the measuring bridge.

If desired, especially trained HEUFT service personnel will carry out installation.

Special care is required for the installation and the test of the shutter monitoring circuit (closing of the radiation window)!

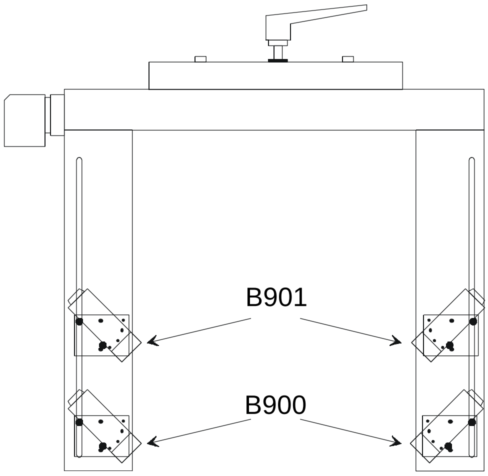
3. Gamma measuring bridge

- Connect the cable W608 with the terminal strip X207 on the CPU card in accordance with the wiring diagram.
- Connect the cable W704 with the terminal strip X120 on the terminal card in accordance with the wiring diagram.

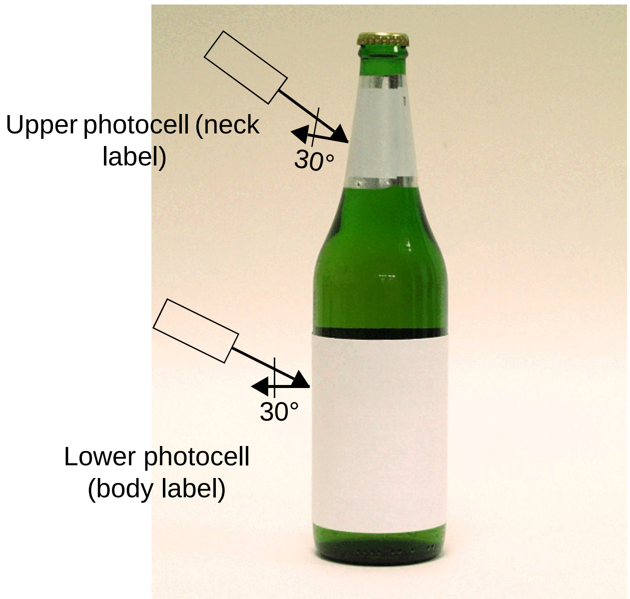
Installation of the **Gamma warning light** and the **shutter switches**
⇒ Gamma or X-ray warning light (optional), page 196
⇒ Shutter switches (optional), page 196

Label detection at the conveyor (BA)

Depending on the task, the label detection on the conveyor requires the application of up to six photocells.
The connection cables are provided with a 13.5 armoured conduit fitting.
Every photocell must be adjusted with regard to height, angle and sensitivity.



Maximum equipment of a measuring bridge for label detection



1. Switch off the device with the main power switch.

2. Mount the cable in the 13.5 armoured conduit fitting (⇒ Mounting of an armoured conduit fitting, page 172).
Several single cables can be fed through the sealing screw.

All-around label (optional)

The installation is different for the check of light labels and dark labels. The photocell numbers have the additional designations HE or DE. The cable numbers are identical but the colours of the cores are different for light labels or dark labels.

3. Upper label photocell (**light label**) B901 HE

   - Connect the cable W901 with the terminal strip X114 on the terminal card in accordance with the wiring diagram.

   Upper label photocell (**dark label**) B901 DE

   - Connect the cable W901 with the terminal strip X114 on the terminal card in accordance with the wiring diagram.

   Lower label photocell (**light label**) B900 HE

   - Connect the cable W900 with the terminal strip X114 on the terminal card in accordance with the wiring diagram.

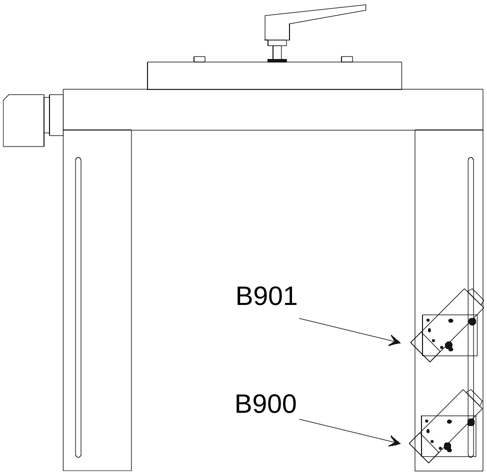
   Lower label photocell (**dark label**) B900 DE

   - Connect the cable W900 with the terminal strip X114 on the terminal card in accordance with the wiring diagram.

The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - the green LED on the photocells is on,
   - the green LEDs LD40 (B900) and LD41(B901) on the terminal card are off,
   - hold a piece of white paper in front of the respective photocell at a distance of 50 mm,
   - the red LED on the photocell is on,
   - on the terminal card the green LEDs LD 40 or 41 of the respective photocell are on.

Measures in case of malfunctions:
- check the connections,
- clean the photocell,
- replace the photocell.



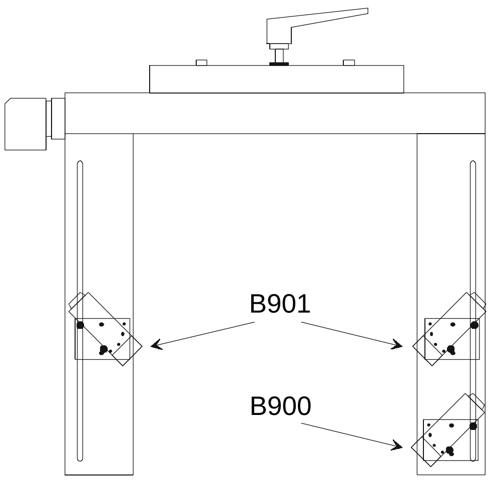
5. Vertical adjustment of the measuring bridge,
   - containers pass through the centre of the bridge with some centimeters as safety distance,
   - every light beam of the photocells hits the label at an angle of 30°,
     - for this purpose loosen both recessed head screws in the guidance of the support,
     - shift the photocell,
     - tighten the recessed head screws again,
     - loosen the recessed head screws on the photocell from the mounting plate,
     - change the tilt angle by screwing the photocells to different threaded holes,
     - tighten the recessed head screws again.

6. Setting the sensitivity of a photocell,
   - have a container with the darkest label and a container without a label available,
   - put the container with the label below the measuring bridge so that the light beam hits the label in the middle,
   - use a small blade screw driver to turn the setting screw in clockwise direction,
     - until the red and the green LED of the photocell come on,
     - turn the regulator in clockwise direction by one more dash of the scale,
     - replace the container by the one without a label,
     - the red LED must be off,
     - the green LED must be on.

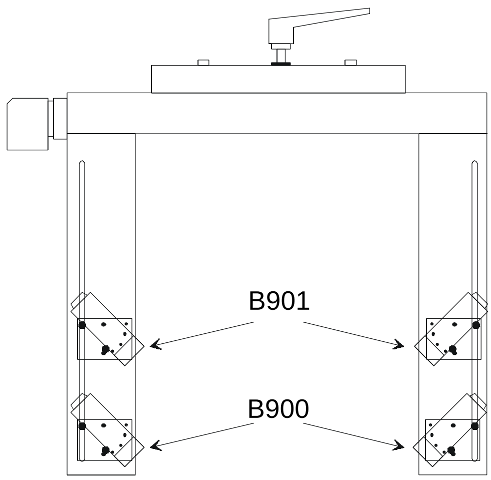
7. Tighten all attachment screws of the photocells and the adjustment devices.

Partial label (optional)

For the detection of partial labels, the photocells are available as pairs.
Two photocells installed opposite to each other have the same operating material designation, the cable designations and the colour codes of the connection cables are also the same.
The connection is carried out as described for all-around labels, photocells with the same designation are connected in parallel. During the test, the respective green LED on the terminal card must be on when paper is held in front of one photocell belonging to a pair.



Label detection, all-around and partial label



Label detection, 2 partial labels

Machine detection

General

The machine detection modules include all sensors to be installed to the filler and/or the labeller. These detection modules provide the following options:

Locator
Allocation of overfilled or underfilled containers to the individual filler valves.

Bottle Burst
Detection of containers burst during the filling process.
Containers filled at the same position as the burst bottle or in its immediate vicinity which bear the risk of containing glass fragments are forcibly underfilled and then rejected. A shower cleans the positions in the filler which are contaminated by glass fragments.

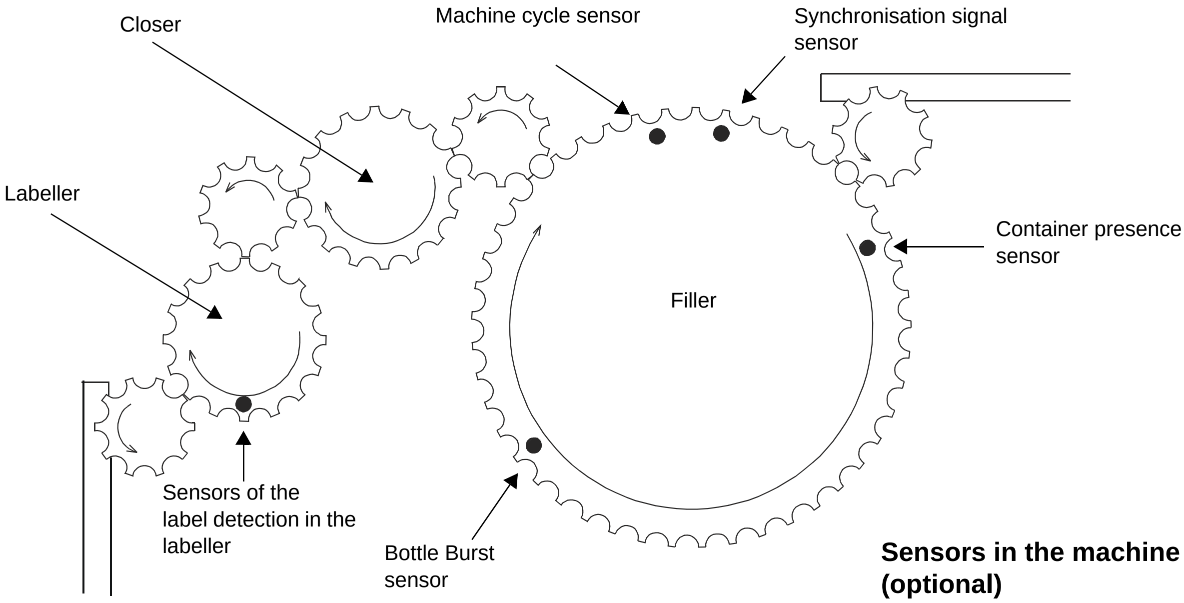
Label detection
Checks the presence of labels on containers.

The detection sensors are mounted and correctly aligned within the machines. Up to four inductive proximity switches are mounted in the machines in order to obtain the signals required for the detection. For the label detection, photocells must be installed in the labeller.

Because of the great variety of machine types, fixed mounting positions for the sensors are not provided. Almost all different types of mounting can be carried out with the delivered sensor supports. For the same reason, the connection cables are not prefabricated as for other detection modules. They must be cut according to requirements and provided with the suitable end sleeves and designations, Whenever possible the cables should be fed through protection hoses in order to prevent mechanical damage. The connection designations of the sensors are related to standard sensors. In individual cases, another sensor type may be delivered for mechanical reasons.

During mounting and adjustments at the sensors, switch off the machine and secure it to prevent it being inadvertently switched on!
Prior to the connection of sensors switch off the standard device with the main power switch secure it to prevent it being inadvertently switched on!

The illustration shows the general sensor positions in a filler and a labeller.



Sensors in the machine (optional)

Connection via a terminal box

For the connection between the filler, the labeller and the standard device up to three terminal boxes are mounted near the filler and the labeller. The terminal strip in these terminal boxes is designated X300 to X302. The terminal boxes must be mounted so that they are protected against mechanical damage.

Close all bore holes with dummy plugs or PG-connections to avoid the penetration of moisture into the terminal boxes. An O-ring must be put below all armoured conduit fittings and dummy plugs during mounting.

1. Switch off the device with the main power switch.

2. Mount the cables in the armoured conduit fittings (⇒ Mounting of an armoured conduit fitting, page 172).

3. Connect terminal strip X300 with the cable W1000 to the terminal strip X107 on the terminal card in accordance with the wiring diagram.

4. Connect terminal strip X301 with the cable W1001 to the terminal strip X107 on the terminal card in accordance with the wiring diagram.

5. Connect terminal strip X303 with the cable W1002

   - to the terminal strip X107 on the terminal card in accordance with the wiring diagram,

   - to the terminal strip X108 on the terminal card in accordance with the wiring diagram.

Machine cycle

The machine cycle is required as reference signal for the machine detection modules. An inductive proximity switch (B1100) is mounted in the filler or the labeller and switches once at every filler or labeller position when these machines rotate. Due to the great number of possible machine types, no fixed mounting position for the sensor can be indicated. However, the holders included in the scope of delivery should allow for mounting in any case.

When selecting the mounting position, attention must be paid that the sensors will not be torn off by a machine in unbalanced condition.

During mounting and adjustments at the sensors, switch-off the filler/labeller and lock them out to prevent inadvertent switch-on!

6. Connect the cable W1100

   - in the respective terminal box to the terminal strip X300 (machine cycle of labeller) or X302 (machine cycle of filler),

   - to the sensor B1100.

7. Function check,
   - switch on the main power switch,
   - the green LED of the sensor B1100 is on,
   - hold metal about 10 mm in front of the sensor,
   - the red LED of the sensor is on,
   - on the terminal card the green LED LD 5 (beside terminal strip X107) is on.

Measures in case of malfunctions:
- check the connections,
- check the connection cable terminal box of the standard device,
- replace the sensor.

During mounting and adjustments at the sensors, always switch off the filler or the labeller, **both machines** in the case of block operation, and lock them out to prevent inadvertent switch-on!
The safety regulations must be observed!

8. Setting

   The proximity switch in the filler/labeller must be adjusted so that it switches from HIGH to LOW when the outfeed starwheel releases a container to the conveyor. At this very moment, the red LED on the switch and the green LED LD5 on the terminal card must come on. Otherwise, the sensor position must be shifted on the outer circumference of the machine. However, it must be assured that the sensor switches only once per machine position.

Container presence (optional)

This sensor is mounted in the infeed area of the filler or the labeller. It switches when a container is at that particular machine position. This function permits to distinguish whether a position is vacant or a container is at that position. This sensor is required for the Bottle Burst module and the label detection combined with the serial fault module. The sensor is an inductive proximity switch. In exceptional cases, an optical sensor may be required instead of the proximity switch.

When selecting the mounting position attention must be paid that the sensors will not be torn off in case of an unbalanced machine operation.

During mounting and adjustments at the sensors, always switch off the filler or the labeller, **both machines** in the case of block operation, and lock them out to prevent inadvertent switch-on!
The safety regulations must be observed!

9. Switch off the device with the main power switch.

Sensor in the labeller

10. Connect the cable W1101 in accordance with the wiring diagram
    - to the terminal strip X300 in the terminal box,
    - to the sensor B1101.

Sensor in the filler

Connect the cable W1101 in accordance with the wiring diagram
- to the terminal strip X302 in the terminal box,
- to the sensor B1101.

The function check requires device switch-on.
The safety regulations must be observed!

11. Function check for the inductive proximity switch,
    - switch on the main power switch,
    - the green LED of the sensor B1101 is on,
    - hold metal about 10 mm in front of the sensor,
    - the red LED of the sensor is on,
    - on the terminal card the green LED LD 8 (beside terminal strip X107) is on.

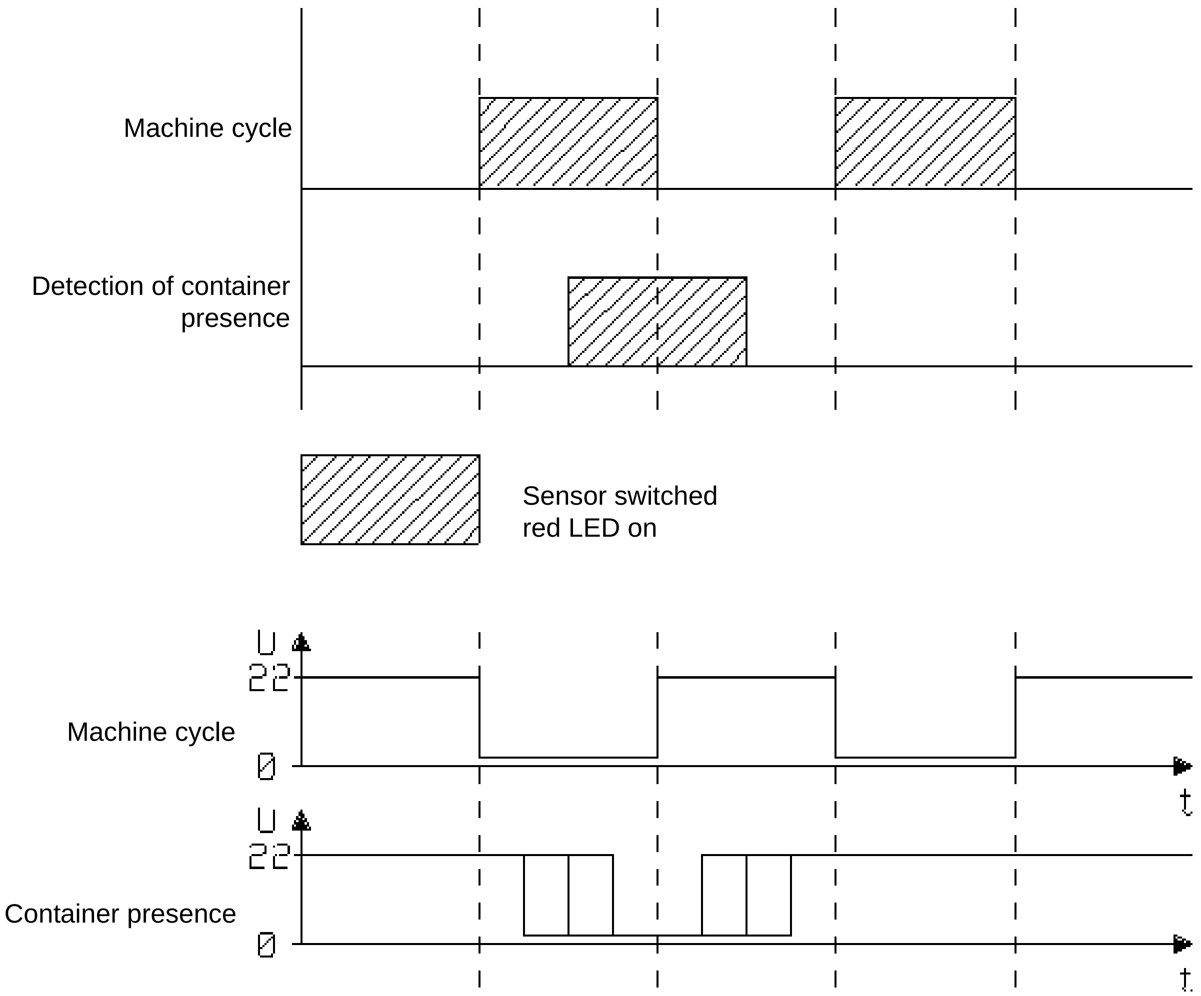
Measures in case of malfunctions:
- check the connections,
- check the connection cable terminal box of the standard device,
- replace the sensor.

During mounting and adjustments at the sensors, always switch off the filler or the labeller, **both machines** in the case of block operation, and lock them out to prevent inadvertent switch-on!
The safety regulations must be observed!

12. Setting

The proximity switch must be adjusted in the filler/labeller so that it switches after the falling signal edge when a container is present. That means the green LED LD5 must come on first and then the green LED LD8.

The illustration shows the required signal flow and the voltage flow of the sensor signals.



Sensors with NPN outputs are used for this detection. A sensor in the switched condition provides a LOW signal level, it provides a HIGH signal level when it is not switched!

RB *basic* V8.00

Bottle Burst (optional)

The sensor is mounted within the filler shortly prior the exit. It checks the presence of containers prior exiting the filler. If a container was detected at a filler position in the inlet area but is not detected in the exit area, it must have burst during the filling process. The sensor is only required for the Bottle Burst module, it is an inductive proximity switch (B1108).

When selecting the mounting position attention must be paid that the sensors will not be torn off in case of an unbalanced machine operation.

During mounting and adjustments at the sensors, switch off the filler and lock it out to prevent inadvertent switch-on!

13. Switch off the device with the main power switch.

14. Connect the cable W1108 in accordance with the wiring diagram

    - to the terminal strip X302 in the terminal box,

    - to the sensor B1108.

The function check requires device switch-on.
The safety regulations must be observed!

15. Function check,
    - switch on the main power switch,
    - the green LED of the sensor B1108 is on,
    - hold metal about 10 mm in front of the sensor,
    - the red LED of the sensor is on,
    - on the terminal card the green LED LD 9 (beside terminal strip X107) is on.

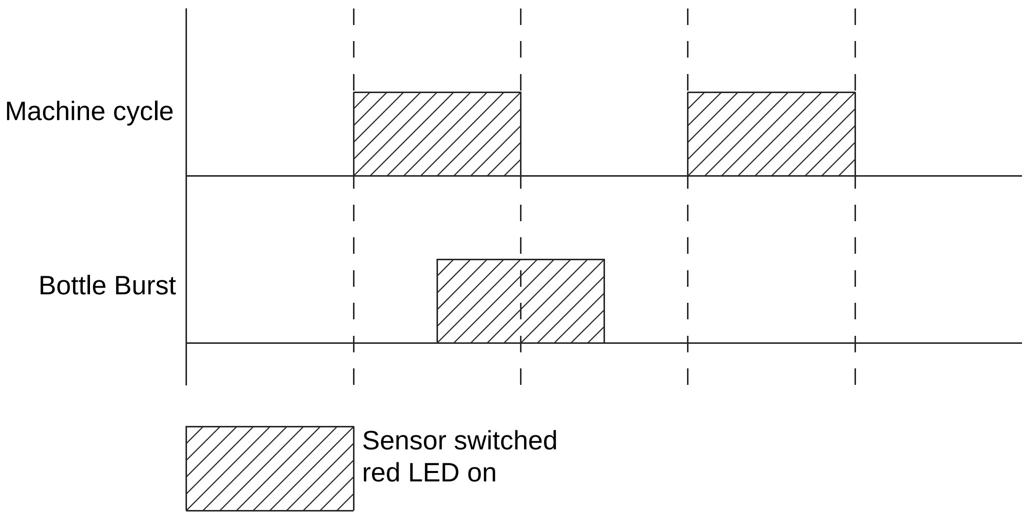
Measures in case of malfunctions:
- check the connections,
- check the connection cable terminal box of the standard device,
- replace the sensor.

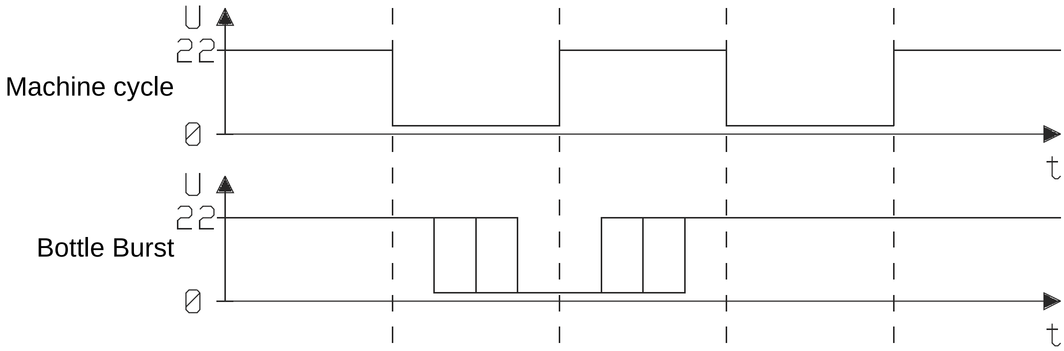
During mounting and adjustments at the sensors, switch off the filler and lock it out to prevent inadvertent switch-on!
Adhere to the safety regulations!

16. Setting

The proximity switch must be adjusted in the filler so that it switches after the falling signal edge when a container is present. That means the green LED LD5 must come on first and the green LED LD9 thereafter.

The illustration shows the required signal flow and the voltage flow of the sensor signals.





Sensors with NPN outputs are used for this detection. A sensor in the switched condition provides a LOW signal level, it provides a HIGH signal level when it is not switched!

Filler synchron (optional)

The sensor is installed in the filler so that it switches once per filler rotation at the position of the 1st filler valve. This signal is used for the synchronisation of the Locator module. An inductive proximity switch (B1107) is used as sensor.

When selecting the mounting position attention must be paid that the sensors will not be torn off in case of an unbalanced machine operation.

During mounting and adjustments at the sensors, switch off the filler and lock it out to prevent inadvertent switch-on!

17. Switch off the device with the main power switch.

18. Connect the cable W1107 in accordance with the wiring diagram

    - to the terminal strip X302 in the terminal box,

    - to the sensor B1107.

The function check requires device switch-on.
The safety regulations must be observed!

19. Function check,
    - switch on the main power switch,
    - the green LED of the sensor B1107 is on,
    - hold metal about 10 mm in front of the sensor,
    - the red LED of the sensor is on,
    - on the terminal card the green LED LD 6 (beside terminal strip X107) is on.

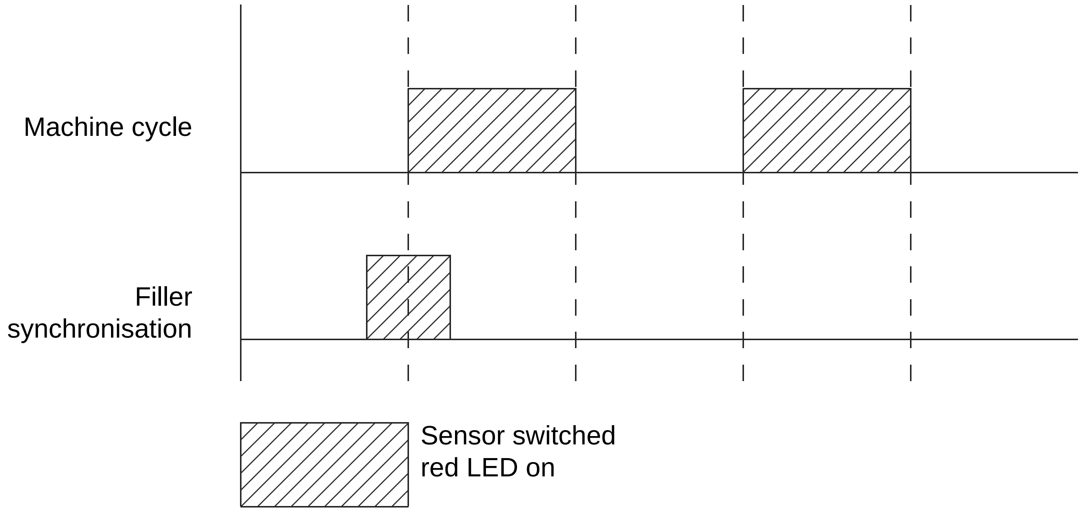
Measures in case of malfunctions:
- check the connections,
- check the connection cable terminal box of the standard device,
- replace the sensor.

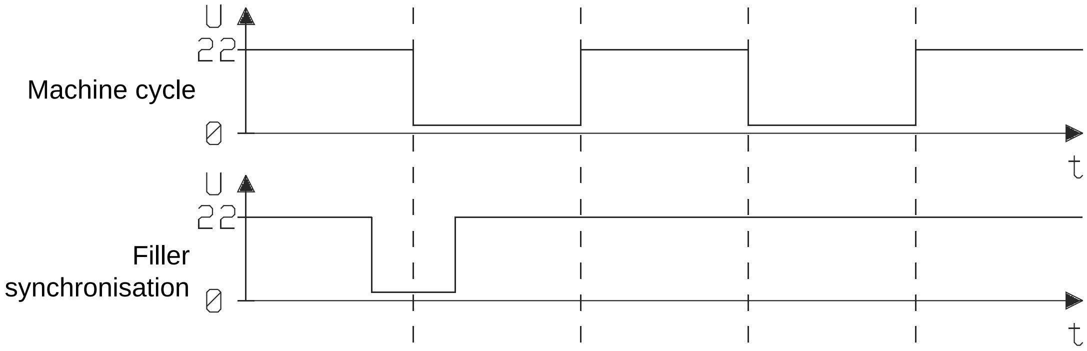
During mounting and adjustments at the sensors, switch off the filler and lock it out to prevent inadvertent switch-on!
The safety regulations must be observed!

20. Setting

The proximity switch must be adjusted in the filler so that it has switched at the 1st valve with the falling signal edge of the machine cycle. That means the green LED LD6 must already be on when the green LED LD5 comes on.

The illustration shows the required signal flow and the voltage flow of the sensor signals.

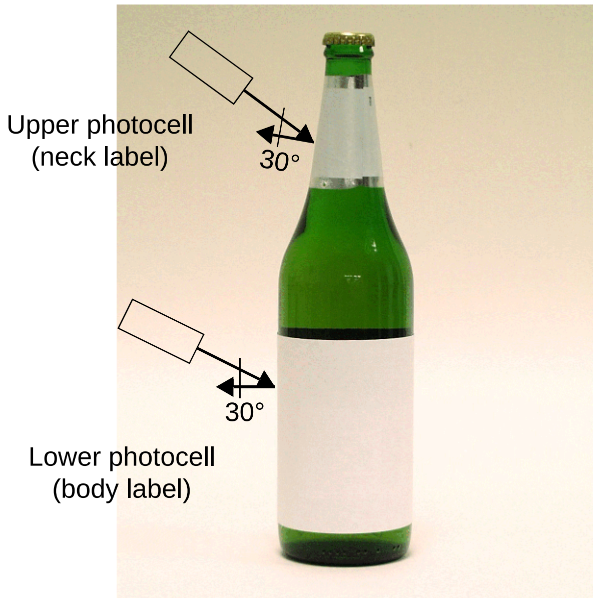




Sensors with NPN outputs are used for this detection. A sensor in the switched condition provides a LOW signal level, it provides a HIGH signal level when it is not switched!

Label detection in the labeller (optional)

Depending on the task, the label detection in the labeller requires the application of up to five photocells. The photocells switch to the light with diffuse reflection characteristics reflected by labels. Every photocell must be adjusted with regard to height, angle and sensitivity.



The mounting elbow and the height of the individual photocells must be adjusted so that the light hits the label at an angle of 30°. Because of the great variety of labeller types, the mounting position cannot be generally determined. However, when selecting the mounting position, it must be assured that the label detection photocells switch while the proximity switch for the machine cycle is in the switched condition.

When selecting the mounting position attention must be paid that the sensors will not be torn off in case of an unbalanced machine operation.

During mounting and adjustments at the sensors switch-off the labeller and lock it out to prevent inadvertent switch-on!

21. Switch off the device with the main power switch.

22. Connect the cables W1102 and W1103 to the terminal strip X300 in the terminal box in accordance with the wiring diagram,

    - for the 1st label detection photocell B1102 use the cable W1102
    - for the 2nd label detection photocell B1103 use the cable W1103

    Connect the cables W1104 through W1106 to the terminal strip X301 in the terminal box,

    - for the 3rd label detection photocell B1104 use the cable W1104
    - for the 4th label detection photocell B1105 use the cable W1105
    - for the 5th label detection photocell (foil detection) B1106 use the cable W1106

The function check requires device switch-on.
The safety regulations must be observed!

23. Function check,
   - switch on the main power switch,
   - the green LED is on at every photocell B1102 through B1106,
   - on the terminal card the green LEDs LD11 - LD15 (beside the terminal strip X107) are not on,
   - hold a piece of white paper at a distance of about 50 mm in front of every photocell,
   - the red LED of the respective photocell comes on,
   - on the terminal card the respective green LED LD 11 - LD15 comes on.

Measures in case of malfunctions:
- check the connections,
- clean the photocell,
- check the connection cable terminal box of the standard device,
- replace the photocell.

During mounting and adjustments at the sensors switch-off the labeller and lock it out to prevent inadvertent switch-on!
The safety regulations must be observed!

24. Setting

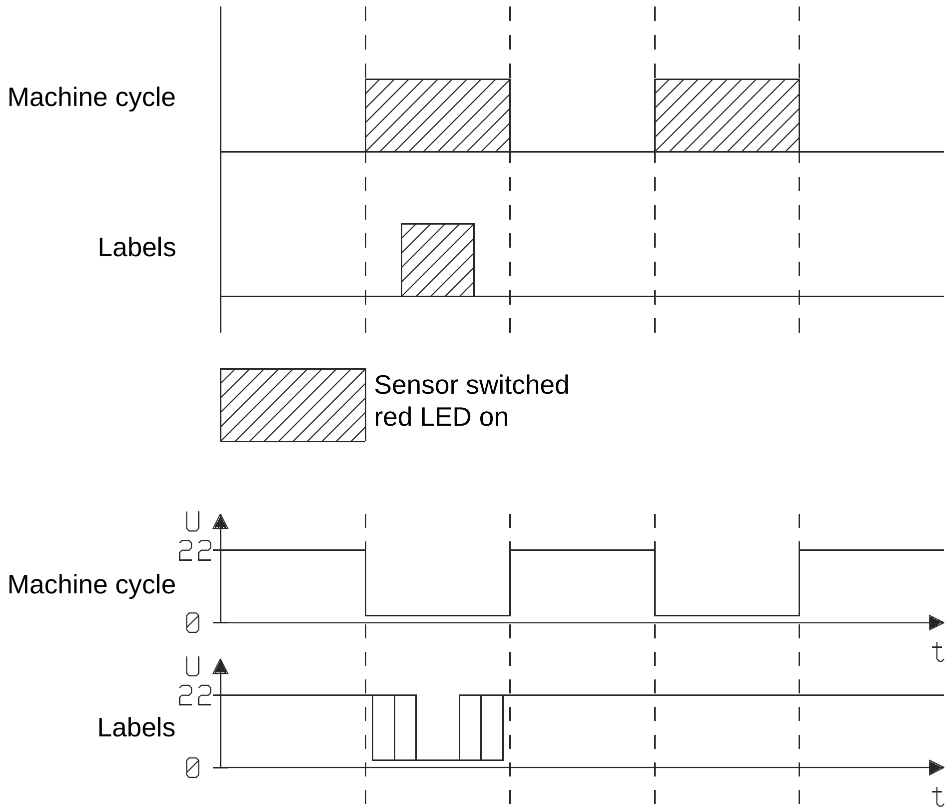
The sensitivity must be adjusted individually for every photocell.

Setting the sensitivity of a photocell,

- have a container with the darkest label and a container without a label available,
- put the container with the label into the labeller in such a way that the light beam hits the label in the middle,
- use a small blade screw driver to turn the setting screw in clockwise direction,
  - until the red and the green LED of the photocell come on,
  - turn the regulator in clockwise direction by one more dash of the scale,
  - replace the container by the one without a label,
  - the red LED must be off,
  - the green LED must be on.

Every photocell of the label detection must switch at least once when a container is passing and the proximity switch of the machine cycle is in the switched condition. The label signal may also be present during the HIGH phase of the machine cycle. The signal of one container must in no case occur within two LOW phases of the machine cycle.

The illustration shows the required signal flow and the voltage flow of the sensor signals.



Sensors with NPN outputs are used for this detection. A sensor in the switched condition provides a LOW signal level, it provides a HIGH signal level when it is not switched!

Output signals (optional)

Two additional output signals are optionally available for the Bottle Burst module.

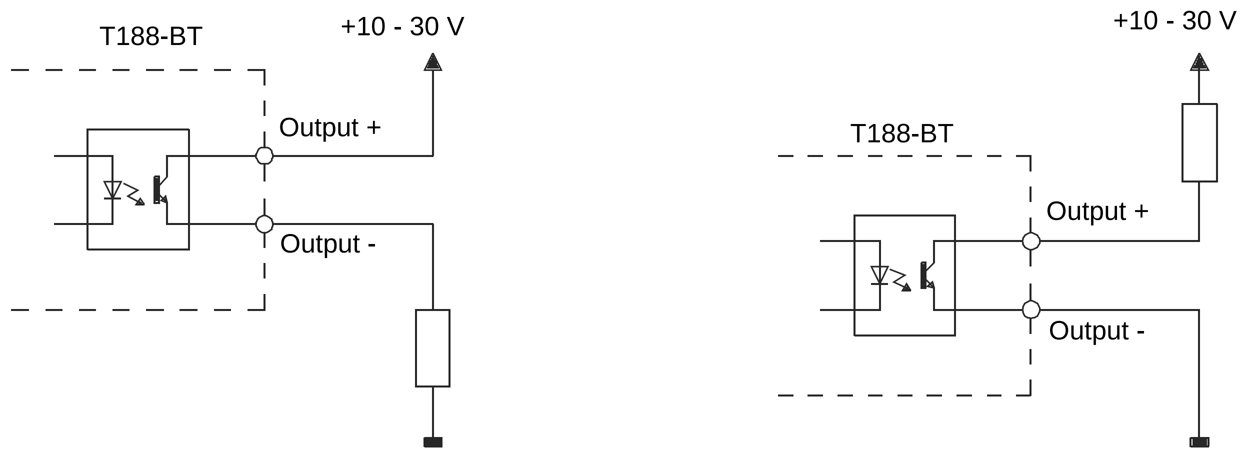
» Forced underfill
This signal can be used to control an individual filler valve. It permits the forced underfill of containers with a risk of containing glass fragments.

» Shower
This signal can be used to control the solenoid valve of a shower in order to clean the filler positions with a risk of glass fragments after a Bottle Burst.

The outputs are potential-free output signals. As long as the electrical limit values are not exceeded, a solenoid valve or a relay can be directly controlled when a recovery diode is used.

Electrical specification of the outputs

Type of circuit:	NPN or PNP via optocoupler
Limit frequency:	1 kHz
Output current:	170 mA
Output voltage:	max. 30V



Potential-free output as PNP-output
Potential-free output as NPN-output

25. Switch off the device with the main power switch.

26. Take the outputs at the terminal strip X302,

  - connect to the terminal strip X302 in the terminal box in accordance with the wiring diagram.

Rejector

DELTA-FW (optional)

The DELTA-FW rejector is equipped with 10 or 16 solenoid valves depending on its version.
For the installation, the solenoid valves must be connected to a compressed-air supply.

1. Switch off the device with the main power switch.

Clear the area in front of the segments!
Rejector segments extend when the air supply is provided!

2. Mount the cable in the 13.5 armoured conduit fitting (⇒ Mounting of an armoured conduit fitting, page 172).

3. Open the stop valve and adjust the filter regulator at the rejector to 4 bar.

4. Connect the cable W500 with the terminal strip X117 on the terminal card in accordance with the wiring diagram.

Bottom photocell

The bottom photocell B404 is delivered with connection cable and armoured conduit fitting 9.

1. Switch off the device with the main power switch.

2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

3. Connect the cable W404 with the terminal strip X110 on the terminal card in accordance with the wiring diagram:

The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - the red and the green LED at the photocell are on,
   - on the terminal card the green LED LD25 (beside the terminal strip X110) is on,
   - interrupt the photocell with a hand,
   - the red LED of the photocell and the green LED LD25 on the terminal card go out.

Measures in case of malfunctions:
- check the connections,
- check the reflector,
- clean the photocell,
- replace the photocell.

5. Photocell adjustment,
   - Adjust the height at the support:
     - loosen the screws and shift the photocell so
     - that the lens of the bottom photocell is 10-20 mm above the conveyor,
     - tighten the screws.

The sensitivity has been set during manufacturing. It may be necessary to change the setting to match the used container material.

- Sensitivity setting:
  - put a container in front of the lens,
  - turn the setting screw in clockwise direction until the red LED comes on,
  - mark the position of the setting screw,
  - remove the container,
  - turn the setting screw in anti-clockwise direction until the red LED is off,
  - mark the position of the setting screw,
  - turn the setting screw to the centre between the two marks.

If this type of setting is impossible, set the screw so that the red LED switches reliably when a container interrupts the photocell.

DELTA-K (optional)

The DELTA-K rejector is equipped with 14, 15 or 16 solenoid valves depending on its version.
For the installation, the solenoid valves must be connected to a compressed-air supply.

1. Switch off the device with the main power switch.

Clear the area in front of the segments!
Rejector segments extend when the air supply is provided!

2. Mount the cable in the 13.5 armoured conduit fitting (⇒ Mounting of an armoured conduit fitting, page 172).

3. Open the stop valve and adjust the filter regulator at the rejector to 3 bar.

4. Connect the cable W500 with the terminal strip X117 on the terminal card in accordance with the wiring diagram.

Installation **bottom photocell (optional)** ⇒ Bottom photocell, page 224.

mono (optional) and *pusher* (optional)

The rejectors *mono* and *pusher* are equipped with a solenoid valve.
For the installation the rejectors must be connected to the compressed-air supply.

1. Switch off the device with the main power switch.

Clear the area in front of the segment!
The rejector segment may extend.

2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

3. Open the stop valve and adjust the filter regulator to 4 bar.

4. Connect the cable W501 with the terminal strip X115 on the terminal card in accordance with the wiring diagram.

The function check requires device switch-on.
The safety regulations must be observed!

5. Function check,
   - switch on the main power switch,
   - press the work/rest switch.
   - the segment remains retracted,
   - the green LED LD 45 (beside the terminal strip X115) is off.

Measures in case of malfunctions:
- check the connections,
- check the air pressure,
- replace the solenoid at the rejector.

The correct connection of the solenoid valve cannot be checked unless the device commissioning is completed.

flip (optional)

The *flip* rejector is equipped with two solenoid valves.
For the installation the rejectors must be connected to the compressed-air supply.

1. Switch off the device with the main power switch.

Clear the area in front of the segment!
The rejector segment may extend.

2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

3. Open the stop valve and adjust the filter regulator P1 to 4 bar and P2 to 3.8 bar.

4. Connect the cable W500 with the terminal strip X117 on the terminal card in accordance with the wiring diagram.

The function check requires device switch-on.
The safety regulations must be observed!

5. Function check,
   - switch on the main power switch,
   - press the work/rest switch.
   - the segment remains retracted.

Measures in case of malfunctions:
- check the connections,
- check the air pressure,
- replace the solenoid valve(s) at the rejector.

The correct connection of the solenoid valves cannot be checked unless the device commissioning is completed.

Peripheral equipment

Encoder

The encoder is delivered with the connection cable and the armoured conduit fitting 9. The cable is connected to the encoder with a plug. Check the tight screw attachment of the plug.

1. Switch off the device with the main power switch.

2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

3. Connect the cable W405 with the terminal strip X111 on the terminal card in accordance with the wiring diagram:

The device and the conveyor must be switched on for the function check.
Adhere to the safety regulations!

4. Function check,
   - switch on the main power switch,
   - switch on the conveyor,
   - LED LD27 (beside the terminal strip X111) is on with medium intensity.

5. Switch-off the conveyor,
   - LED LD27 will shortly flicker when the conveyor comes to a stop.

Measures in case of malfunctions:
- check the connections,
- check the plug on the encoder,
- check the mechanical coupling to the conveyor.

Trigger

Main trigger (1st trigger)

The main trigger is always the first trigger in moving direction. In general, this is the trigger at the measuring bridge of the standard device. When a repositioning of containers is required between a machine and the standard device because of curves or transitions between conveyors, the additional trigger mounted for this purpose will be assigned the function of a 1st trigger. The table below provides a general view of the variable options.

Additional trigger between machine and standard device (optional)	**Trigger at the standard device**	**Trigger between standard device and rejector (optional)**	**Trigger for reject verification (optional)**
if available: Trigger 1	trigger 2	dropped	if available: trigger 3
not available	trigger 1	if available: trigger 2	if available: trigger 3
not available	trigger 1	not available	if available: trigger 2

Main trigger as 1st trigger at the standard device

The main trigger is mounted at the measuring bridge of the closure detection and is delivered with the connection cable and the armoured conduit fitting. The installation is dependent on the fact whether the device is equipped with or without the closure detection *sonic*.

1. Switch off the device with the main power switch.
2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).
3. In case of devices **without** the closure detection *sonic*:

   - Connect the cable W401 with the terminal strip X110 on the terminal card in accordance with the wiring diagram:

   In the case of devices **with** a closure detection module *sonic* ⇒ **Wiring diagram BA, closure detection *sonic*:**

   - Connect the cable W401 to the terminal strip X1401 in the terminal box in accordance with the wiring diagram.

   - Connect the terminal box by using the cable W1412 with the terminal strip X110 on the terminal card in accordance with the wiring diagram.

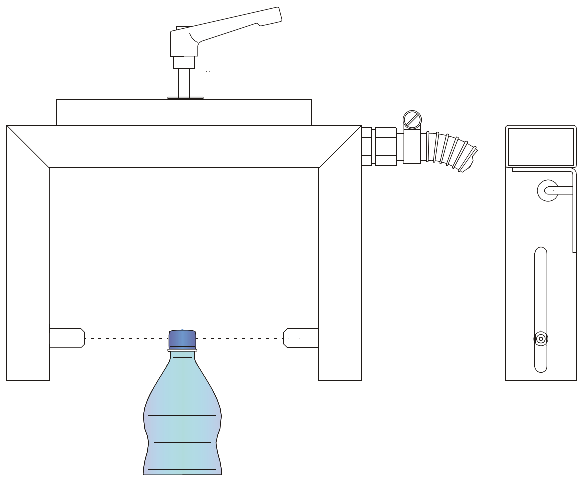
The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - the transmitter lens of the photocell is illuminated in red,
   - the red and the green LED at the photocell are on,
   - the green LED LD20 on the terminal card (beside terminal strip X110) is on,
   - interrupt the light beam with a hand,
   - the red LED at the photocell and the green LED on the terminal card will go out

Measures in case of malfunctions:
- check the connections,
- clean the photocell,
- replace the photocell.

5. Photocell adjustment,
   - adjust the height with the vertical adjustment device of the measuring bridge, the closure of a container interrupts the light beam.

Do not change the lens supports,
The sensitivity has been set during factory assembly.



Additional trigger between machine and standard device as 1st trigger

1. Switch off the device with the main power switch.

2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

3. With additional terminal box:

   - Connect the cable, additional trigger, W402 in the additional terminal box to the terminal strip X400 in accordance with the wiring diagram.

   - Connect the cable, additional trigger, W407 from the terminal strip X400 in the additional terminal box to the terminal strip X110 on the terminal card in accordance with the wiring diagram.

   Without additional terminal box:

   - Connect the cable, additional trigger, W402 without additional terminal box to the terminal strip X110 on the terminal card in accordance with the wiring diagram.

Trigger at the control unit as 2nd trigger

1. Switch off the device with the main power switch.

2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

3. Connect the cable of the trigger at control unit W401 with the terminal strip X110 on the terminal card in accordance with the wiring diagram.

Additional trigger as 2nd trigger (optional) and as reject verification (optional)

The additional trigger B402 or the reject verification trigger B403 are delivered with additional terminal boxes, connection cables and armoured conduit fitting. The additional trigger is connected as 2nd trigger and the reject verification trigger as 3rd trigger. If the additional trigger is not available, the reject verification trigger becomes 2nd trigger.

Both components have the same design and are delivered with the same cable designation. The cable designation must be changed on location according to the function.

1. Switch off the device with the main power switch.

2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

Additional trigger

3. With additional terminal box:

- Connect the cable, additional trigger, W402 in the additional terminal box to the terminal strip X400 in accordance with the wiring diagram.

- Connect the cable, additional trigger, W407 from the terminal strip X400 in the additional terminal box to the terminal strip X110 on the terminal card in accordance with the wiring diagram.

Without additional terminal box:

- Connect the cable, additional trigger, W402 without additional terminal box to the terminal strip X110 on the terminal card in accordance with the wiring diagram.

Reject verification (as 3rd trigger)

With additional terminal box:

- Connect the cable, additional trigger, W402* in the additional terminal box to the terminal strip X401 in accordance with the wiring diagram.

- Connect the cable, reject verification, W407 from the terminal strip X401 in the additional terminal box to the terminal strip X110 on the terminal card in accordance with the wiring diagram.

Without additional terminal box:

- Connect the cable, additional trigger, W402* without additional terminal box to the terminal strip X110 on the terminal card in accordance with the wiring diagram.

The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - the transmitter lens of the photocell is illuminated in red,
   - the red and the green LED at the photocell are on,
   - the green LEDs LD23 (2nd trigger) and LD24 (3rd trigger) on the terminal card (beside the terminal strip X110) are on,
   - interrupt the light beam with a hand,
   - the red LED at the photocell and the green LED on the terminal card will extinguish.

Measures in case of malfunctions:
- check the connections,
- clean the photocell,
- replace the photocell.

5. Photocell adjustment,
   - adjust the height with the vertical adjustment device of the measuring bridge, the closure of a container interrupts the light beam.

Do not change the lens supports,
The sensitivity has been set during factory assembly.

Warning light (optional)

The warning light is mounted to the conveyor.

1. Switch off the device with the main power switch.

2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

3. Connect the cable W406 with the terminal strip X116 on the terminal card in accordance with the wiring diagram.

⚠ The function check requires device switch-on.
The safety regulations must be observed!

4. Function check,
   - switch on the main power switch,
   - the yellow light comes on,
   - press the work/rest switch,
   - the red light comes on,
   - the green light does not come on unless the device is operative,
   - the three LEDs (beside the terminal strip X116) are on in accordance with the colour of the warning light.

Measures in case of malfunctions:
- check the connections,
- check the light bulbs in the warning light,
- replace the light bulbs.

External signals

Five potential-free inputs and eight potential-free outputs are available for the connection of higher control and guidance systems. The functions of the inputs and outputs are preset and dependent on the operating program.

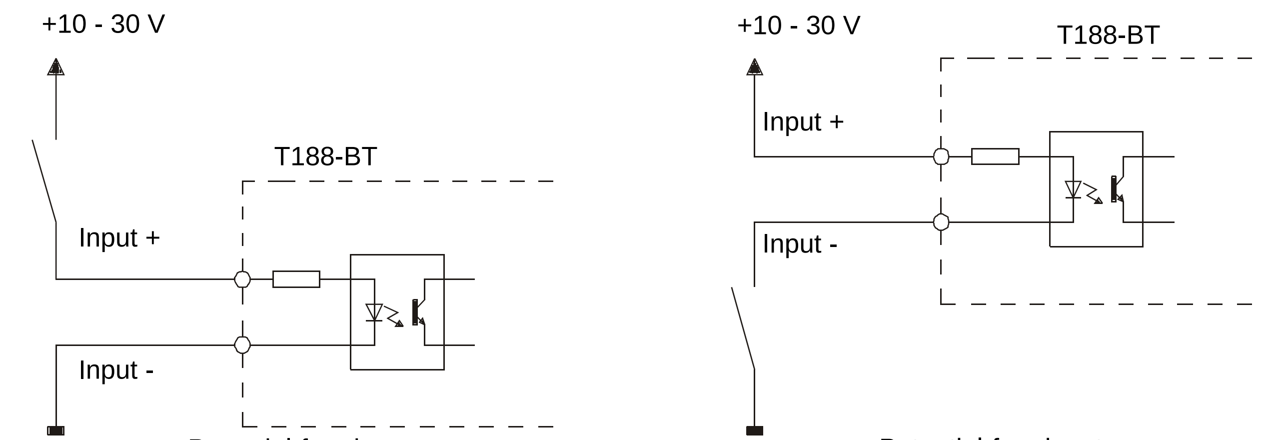
External inputs

The occupation of the counter inputs is described on page 46, their general description can be found on page 83.
The following inputs are available:

Input	Function
Counter 1	increment external counter 1 (counter 21)
Counter 2	increment external counter 2 (counter 22)
Counter 3	increment external counter 3 (counter 23)
Counter 4	increment external counter 4 (counter 24)
Counter reset	clear all counters when the signal is released

Electrical specification of the inputs

Type of circuit:	NPN or PNP via optocoupler
Limit frequency:	15kHz
Input current:	max. 15mA
Input voltage:	max. 30V 0 - 5V low level 10 - 30V high level



Potential-free input connection to PNP-output

Potential-free input connection to NPN-output

The connection cable is not included in the scope of delivery for the device. We recommend to use the cable colours mentioned on the next page for the connection. The cable must be designated as W1200. When the "brands, external program change" module is also part of the device equipment, a 20-core cable must be used as connection cable W1200 at the terminal strip X112, ⇒ Brands, external program change (optional), page 239

1. Switch off the device with the main power switch.

2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

RB *basic* V8.00

3. Connect the cable W1200 with the terminal strip X112 on the terminal card in accordance with the wiring diagram.

When the "brands, external program change" module is also part of the device equipment, connect the additional cables to terminal strip X112, ⇒ Brands, external program change (optional), page 239

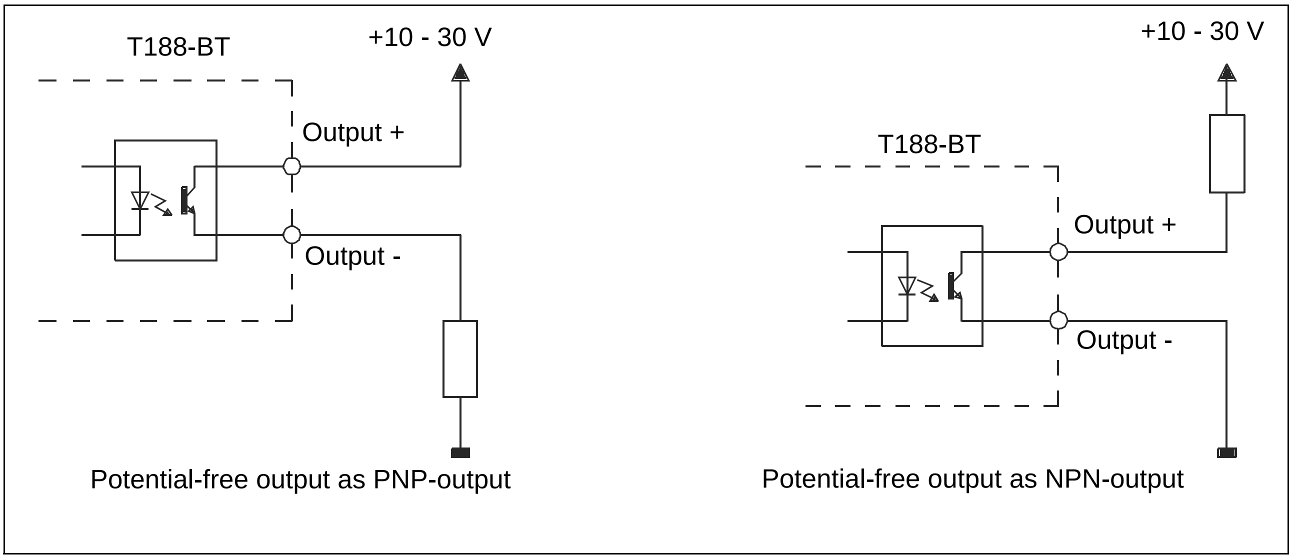
External outputs

The occupation of the counter outputs is described on page 47, their general description can be found on page 83 and the switch-off pulse (stop signal) on page 82. The watchdog output signals that the operating program of the device is not functioning correctly or failed because of a hardware fault.
The following outputs are available:

Output	**Function**
Counter 1	increment the counter
Counter 2	increment the counter
Counter 3	increment the counter
Counter 4	increment the counter
Counter reset	clear all counters
Stop 1	conveyor stop signal for serial fault, standard, reject verification and jam detector
Stop 2	2nd stop signal for serial fault in the labeller and Locator (not applicable for laning/fluid devices)
Watchdog	processor monitoring controlled by the hardware

Electrical specification of the outputs

Type of circuit:	NPN or PNP via optocoupler
Limit frequency:	1 kHz
Output current:	max. 170 mA
Output voltage:	max. 30V



The connection cable is not included in the scope of delivery for the device. We recommend to use the following cable colours for the connection. The cable must be designated as W1300. The connection cable must be shielded and be mounted into a armoured conduit fitting according to the description on page 172.

1. Switch off the device with the main power switch.

2. Mount the cable in the armoured conduit fitting 9 (⇒ Mounting of an armoured conduit fitting, page 172).

3. Connect the cable W1300 with the terminal strip X119 on the terminal card in accordance with the wiring diagram.

Brands, external program change (optional)

The device is provided with four additional potential-free inputs. These inputs can be used for program selections.

Input
Program selection 1, least significant bit
Program selection 2
Program selection 3
Program selection 4, most significant bit

1. Switch off the device with the main power switch.

2. Connect the cable W1200 with the terminal strip X112 on the terminal card in accordance with the wiring diagram ⇒ External inputs, page 236.

Signal acceptances

Signal acceptance at the conveyor (optional)

The installation of the signal connections for the acceptance of signals is the same as the one described for the inputs of the external signals. The same signal specifications are valid.

The connection cable is not included in the scope of delivery for the device. We recommend to use the cable colours as given below for the connection. The cable must be designated as W1200.

1. Switch off the device with the main power switch.

2. Mount the cable in the respective armoured conduit fitting (⇒ Mounting of an armoured conduit fitting, page 172).

3. Connect the cable W1200 to the terminal strip X112 on the terminal card in accordance with the wiring diagram.

Signal acceptance in the machine (optional)

The installation of the signal connections for the acceptance of signals is the same as the one described for the inputs of the external signals. The same signal specifications are valid.

The connection cable is not included in the scope of delivery for the device.

1. Switch off the device with the main power switch.

2. Mount the cable in the respective armoured conduit fitting (⇒ Mounting of an armoured conduit fitting, page 172).

3. The cable is generally connected on the terminal card. Only in case of devices for full container checks with a terminal box A2 in the filler for machine signals the cable is connected there.

   without terminal box:

   - Connect the cable to the terminal strip X108 on the terminal card in accordance with the wiring diagram.

   with terminal box A2:

   - Connect the cable in the terminal box A2 with the terminal strip X302 in accordance with the wiring diagram.

   - Connect the terminal strip X302 to the terminal strip X108 on the terminal card via cable W1002 in accordance with the wiring diagram.

Laning (VF)

Jam detector (optional)

The connection cable for the jam detector at lane 1 must be designated as W903, the one for the jam detector at lane 2 must be designated W904.

1. Switch off the device with the main power switch.

2. Connect the cables to the proximity switches mounted in the respective jam detectors.

3. Mount the cables in the respective armoured conduit fitting (⇒ Mounting of an armoured conduit fitting, page 172).

4. Connect the cables to the terminal strip X114 on the terminal card in accordance with the wiring diagram.

End of installation work

1. Attach the cable to the CPU card,
   - with cable binders,
   - at the support of the printed circuit board and the support at the inside of the lower casing ,
   - sufficient cable length must be available between attachment points to allow door opening.

2. Attach the cable shielding and the cable duct,
   - tighten the nuts on the stud bolts left and right of the cable duct,
   - store cable loops within the cable duct,
   - close the cable duct with the cover.

3. Check whether all armoured conduit fittings at the lower side of the device are closed,
   - insert dummy plugs and sealing rings in the vacant armoured conduit fittings.

4. Check the switching of sensors.

The device and the conveyor must be switched on for the function check.
Adhere to the safety regulations!

Sensor	Designation	LED	Check by
Main trigger	B401	LD20	interrupt
Trigger 2	B402	LD23	interrupt
Trigger 3	B403	LD24	interrupt
Bottom photocell	B404	LD25	interrupt
Encoder	B405	LD27	conveyor start and stop
Closure detection - optical	B800	LD21	hold hand in front of sensor
Closure detection optical, empties	B800	LD21	hold hand in front of sensor
Closure detection - inductive	B801	LD21	hold metal in front of sensor
Closure detection - excessive Height	B802	LD22	interrupt
Closure detection cans	B803	LD39	hold metal in front of sensor
Foil detection	B804	LD44	hold paper in front of sensor
Label detection	B900	LD40	hold paper in front of sensor
Label detection	B901	LD41	hold paper in front of sensor
Machine cycle	B1100	LD5	hold metal in front of sensor
Filler synchronisation	B1107	LD6	hold metal in front of sensor
Container presence	B1101	LD8	hold metal in front of sensor
Bottle Burst	B1108	LD9	hold metal in front of sensor
Label detection	B1102	LD11	hold paper in front of sensor
Label detection	B1103	LD12	hold paper in front of sensor
Label detection	B1104	LD13	hold paper in front of sensor
Label detection	B1105	LD14	hold paper in front of sensor
Label detection	B1106	LD15	hold paper in front of sensor

5. Clear the installation area.

6. Check the installation area,
   - whether there are parts or tools remaining, remove them if any
   - whether all connections are fixed.

7. Close the door and attach it with four hexagon socket screws.

8. Switch on the conveyor.

Commissioning

Preparations

General

Complex procedures are required for the appropriate setting of the device after mounting and installation of all optional components. Due to this reason, commissioning should be carried out during a longer production break as complete procedure without interruptions.

Commissioning is based on the condition that mounting and installation are correct and the device is switched-on.

Explanations regarding the device operation

During the first device start-up, the system loads default values for all parameters in the RAM and saves them in the EEPROM. The saving of parameters which were changed during commissioning is carried out automatically 30 seconds after the last change or when switching to the stand-by mode.

Data changed at the operator level will not be saved.

The current program number, the counter readings and the counter of operating hours are saved in the battery buffered RAM. This ensures their availability when the device is switched on again.

With the exception of the power supply for the HF fill level detection, the 24 V power supply is switched off in the stand-by mode. Therefore, the stand-by mode should be used for short interruptions of production. The stabilisation phase is not required, the detection module is immediately operative again.

The software includes a self-monitoring function. When it is blocked for a period longer than 3 seconds (due to a too high demand of the interrupts or an internal fault), the system activates a check LED on the CPU card, restarts the operating program and emits a potential-free signal for use by the customer.

The default data can be loaded at any time: Either only the data for a particular container program or all device data.
(⇒ Detection modules in this chapter)

The data of any program can be copied into the current program. This option is desirable when different programs differ only by some few parameters (⇒ Detection modules in this chapter).

Adjustments and entry of parameters

All mechanical adjustments (vertical and horizontal adjustment of measuring bridges, position of trigger photocells) must be carried out for every container program. The values obtained must be entered in the Condensed Manual applied to the device casing.

The necessary adjustments are described with the commissioning of the respective detection module. All distance inputs relating to the detection modules in the conveyor area always refer to the position of the main trigger.

All parameter inputs (device and program related data) must be entered in the respective data sheets for security reasons:
⇒ available in the Appendix of the Operator's Manual for all programs,
⇒ sample data sheets in the appendix of this Reference Handbook.

Further proceedings

The further proceeding during commissioning is dependent on the individual components within the frame of the entire procedure. The individual components are available according to the optional device equipment. In order to ensure the overall function, the standard device must be configured first and the adjustments of the detection modules to the different container types must be carried out thereafter.

Standard device

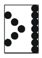
Main trigger

General

The first trigger, which is the main trigger, is used for the initial container identification and the acceptance of the container position in the software for further processing.

Adjusting parameters

Checking the main trigger function

Change to the **masking of input signals menu** , path 3 (⇒ Access to the menu levels, page 33). Among the inputs 17 to 24, bit 0 (right) indicates the main trigger.

1. Does the photocell switch?
   Interrupt the optical path; the signal must change then.

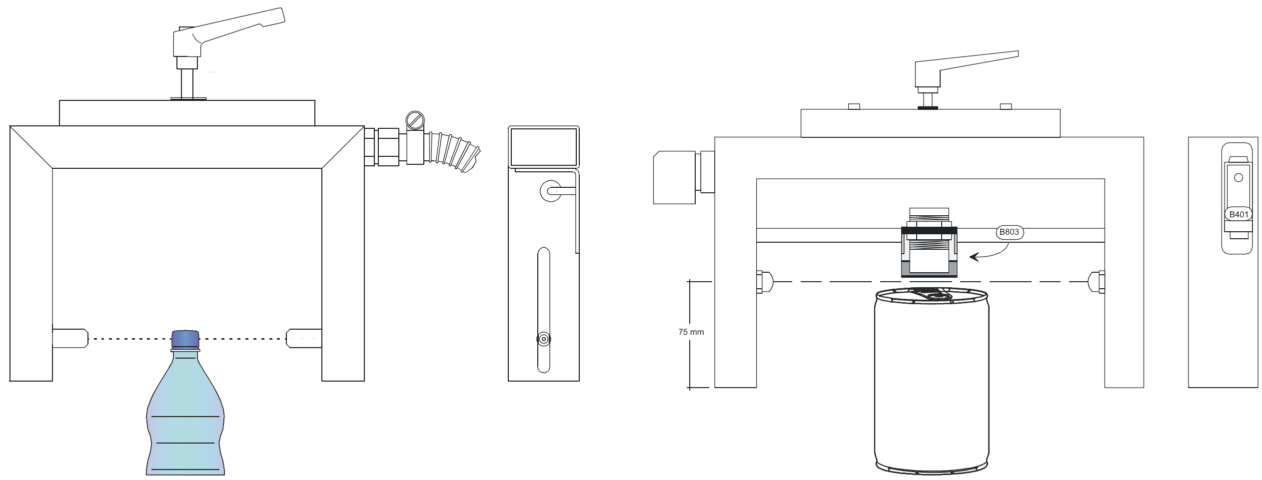
2. Is the switching direction correct?
   Photocell covered = signal LOW (the dot disappears from the display).

3. Is the signal not LOW?
   Invert the mask for bit 0.

Vertical adjustment of a trigger photocell

Bottles:	adjust to the height of the closure centre.
Cans:	adjust to approximately 3 mm below the upper edge, i.e. put a can in the centre below the measuring bridge in the upper position. Reduce the height until the photocell reacts, then reduce the height by another 3 mm.

➔ Check whether the display of the LEDs at the trigger photocell is correct,
the green LED is steady, the red LED is on when the light beam is not interrupted and goes out in case of an interruption.



Vertical adjustment of the trigger at the standard device

Encoder

General

The rotating pulse generator used as encoder generates 800 pulses per rotation of the drive shaft. Depending on the chain wheel used, this number of pulses corresponds to a variable distance the conveyor has moved. By counting these pulses, the software is able to track the exact position of containers that have passed the trigger. In order to carry out an exact allocation of the number of pulses to the covered distance, a conversion factor must be entered which is the predivisor.

In order to determine this predivisor, the device provides an easy to operate measuring function. On object is measured while the conveyor is in operation. The system automatically calculates the predivisor value from the entered length of the object and the counted number of encoder pulses during this distance. The unit for the predivisor value is the number of encoder pulses divided by 64 mm of conveyor distance [pls/64 mm].

☞ 128 pls/64 mm = 2 pls/mm
2 encoder pulses are generated per 1 mm of conveyor movement.

The object must not be transparent and have a length between 20 mm and 999 mm at the height of the trigger photocell. The longer the object the more exact is the measuring result. With a length of 20 mm the obtained value deviates by +/-6 points, with a length of 100 mm by +/-2 points. Therefore, an object of at least 100 mm should be used. During the measuring process, the object must move in synchronisation with the conveyor. The measuring distance is the distance during which the optical path of the main trigger was interrupted. Several repetitions of the measuring procedure avoid measuring errors and increase the accuracy.

Teeth of the chain wheel	Predivisor
17	158
18	149
19	141
20	134
21	128
22	122
23	116
24	111
25	107
26	103
27	99
28	96
29	93

The calculated and displayed predivisor value must be entered in the encoder menu. Now the system can determine the conveyor speed and track the position of every container between the main trigger and the rejector or the reject verification trigger.

Adjusting parameters

Change to the **encoder menu** . All following path information is related to the encoder menu.

Check of the encoder function

1. In path 2 enter the value 0 (default value).

2. In path 6 enter the value 128 [pls/64 mm] (default value).

3. Change to path 1.

For the function check it is necessary to switch on the conveyor.
The safety regulations must be observed!

4. Switch on the conveyor.

5. The display must change to a value other than 0 (when 0 is displayed ⇒ "Trouble shooting" chapter, Checking the encoder, page 379).

6. Switch off the conveyor.

Entry of the predivisor value

The correct predivisor value must be entered in order to determine the correct conveyor speed.

1. Check whether the correct encoder for the conveyor is connected to the device.

2. Take the measures of an object intended to interrupt the optical path of the main trigger, minimum length 100 mm, maximum length 999 mm.

3. Enter this value (in mm) in path 4.

4. Change to path 5.

The measuring procedure requires conveyor operation.
The safety regulations must be observed!

5. Switch on the conveyor.

6. Put the measuring object on the conveyor prior to the main trigger seen in moving direction and let it pass the trigger.
   A counter starts with the falling edge of the trigger signal, which is the begin of the object, and counts continuously until the rising edge of the signal is reached, which is the end of the object.
   The final counter value is the predivisor value to be entered. Repeat this measuring procedure several times to avoid false results.

7. Enter the value in path 6 [pls/64 mm].

8. Check the production speed:
   The following limit values are applicable:

Maximum conveyor speed:	1,500 mm/s
Set output:	max. 72,000 cont./h

The normal device function is no longer ensured when exceeding these values!

9. Switch off the conveyor.

Entry of distances

General

The entry of distances must be very accurate in order to ensure a reliable tracking of container positions. The system calculates the centre of a container from the entered diameter value.
Enter all distances in units of [mm]. The order of entries is not specified.

Adjusting parameters

Change to the **distances menu** . All following path information is related to this menu.

Defined distances

1. In path 22 enter the distance from the main trigger to the closure detections inductive/optical/pressure/ sonic /optical for empties in path 22.

   Depending on the task, the check for closure presence is carried out by different sensors. These sensors are mounted to the measuring bridge with special supports. This results in type-related distances between the position of the main trigger and the closure detection:

   If the 1st trigger is not the trigger at the standard device but an additional trigger between a machine and the device, the distance between the 1st trigger and the trigger at the standard device must be added to the respective value.

inductive; bottles	0 mm (default value)
inductive; cans	28 mm
optical	30 mm
pressure	28 mm
sonic	24 mm
optical/empties	120 mm

2. In path 23 enter the distance from the main trigger to the fill level detections HF, Gamma underfill or infrared underfill (full container checks only):

   HF / Gamma UF / infrared UF 120 mm (default value)

3. In path 24 enter the distance from the main trigger
   to the label detection or the Gamma overfill detection or the infrared overfill detection in the case of full container checks, or
   to the residual liquid detection HF or Gamma in the case of Laning/Fluid:

label detection/Gamma OF/infrared OF	240 mm (default value)
Residual liquid detection	240 mm (default value)

   The distance for the foil detection is programmed and invariable.

   X-ray fill level detection module ⇒ Page 255

4. In path 26 enter the distance from the main trigger to the bottom photocell:

   Bottom photocell 280 mm (default value)

   Compare the displayed values with the default values (indicated on the parameter sheet for device parameters) and make corrections, if necessary.

X-ray fill level detection

In order to obtain a stable automatic measurement of the gap value, the distances must be precisely determined. Enter the distances in path 23 for the X-ray underfill or in path 24 for the X-ray overfill.

Underfill

1. In path 23 enter the distance from the main trigger to the fill level detection **X-ray for underfill checks**:

   X-ray UF 120 mm (default value)

2. Let **one** correctly filled container pass several times below the measuring bridge. Read and write down the measured value in the **fill level detection parameters menu**, path 3.

3. Reduce the distance by steps of 2 to 4 mm up to a value of 120 mm minus the container diameter at the measuring height (e.g. can diameter 66 mm: 120 - 66 = 54 mm). Write down the distances and measured values.

4. Enlarge the distance by steps of 2 to 4 mm up to a value of 120 mm plus the container diameter at the measuring height. Write down the distances and measured values.

5. Determine the distances where the measured value has reached approximately 3/4 of the maximum measured value.

6. Enter the mean value of both distances in the **distances menu**, in path 23.

Overfill

7. In path 24 enter the distance from the main trigger to the **fill level detection X-ray for overfill checks**:

   X-ray OF 240 mm (default value)

8. Determine the distance in the same way as described under item 2. to 5.

9. Enter the mean value in the **distances menu** , in path 24.

Other distances

1. In path 27 enter the distance from the main trigger to the rejector.

   DELTA FW / DELTA-K:

   Measure the distance from the main trigger to the beginning of the first segment and enter this value.

   mono / *pusher*:

   Measure the distance from the main trigger to the middle of the segment and enter this value.

   flip:

   Measure the distance from the main trigger to the middle of the rejector segment.

   Add 12 mm to the measured distance and enter the obtained value as distance value.

2. In path 30 enter the distance from the main trigger to the counter.
   The counter, a virtual position, must be located after the rejector and prior a possible subsequent reject verification trigger. The value should be 200 mm higher than the one entered in path 27.

3. In paths 28 and 29 enter the distance from the main trigger to the 2nd or 3rd trigger.

When an additional trigger and a reject verification are mounted, the additional trigger is the 2nd trigger and the reject verification trigger is the 3rd trigger. When only the reject verification trigger is mounted, it is then the 2nd trigger.

For trigger commissioning enter higher values than those entered in path 27 or 30. This ensures the correct verification of distances (⇒ Distance checks, page 268).

The correct entry of distances for these triggers (according to the mechanical mounting) will be carried out after the commissioning of the detection modules at the end of this chapter.

Entry of container parameters

General

The following steps for commissioning require special specifications regarding the containers to be checked later on under production conditions. Special sets of program data must be entered for containers with different parameters (shape, diameter, fill level, contents). This program configuration permits to change to another production program at any time and to activate another set of data during the later production process.

The following steps for commissioning are based on the assumption that inputs are made for only one type of production container and that there will be no program change during commissioning. The data for other container types for another production program must be entered afterwards in the same order (⇒ Program selection/Brand change).

Adjusting parameters

Change to the **general container parameters menu** . All following path information is related to this menu.

Neck diameter

The entry of the neck diameter (in mm) is made in path 1. This value must be measured at the height of the main trigger. It is required for the correct function of detection modules.

Body diameter

The entry of the body diameter (in mm) is made in path 2. The largest part of the container diameter must be measured. This value is required for the correct function of the rejector.

These entries are required at the present state of commissioning in order to permit the check of the entered distance data.

The entry of the body diameter is not necessary in installations which process cans because there is normally no difference between the neck and the body diameter.

Adjusting the rejector

General

Depending on the required type of rejection and the container type, four different rejector types can be used.

DELTA-FW

Gentle rejection of faulty containers in upright position and of containers or glass fragments lying on the conveyor. A bottom photocell is used to detect objects lying on the conveyor. If the optical path of the photocell is interrupted even though a good container is not expected at this position, the system activates the DELTA-FW rejector. The DELTEA-FW rejector is activated only when required in order to minimise the mechanical wear and tear.

DELTA-K

Gentle rejection of faulty containers in upright position and of cans. An optional bottom photocell is used for the detection of too low containers, containers with a broken neck and foreign objects. If the optical path of the photocell is interrupted even though a good container is not expected at this position, the system activates the DELTA-K rejector. The DELTEA-K rejector is activated only when required in order to minimise the mechanical wear and tear.

mono* and *flip

Rejection of faulty containers in upright position to a parallel conveyor or a waste container by hitting the container with a defined push.

pusher

Rejection of faulty cans in a waste container by hitting the can with a defined push.

Adjusting parameters

The settings are dependent on the rejector type used. They are described on the following pages.

DELTA-FW (optional)

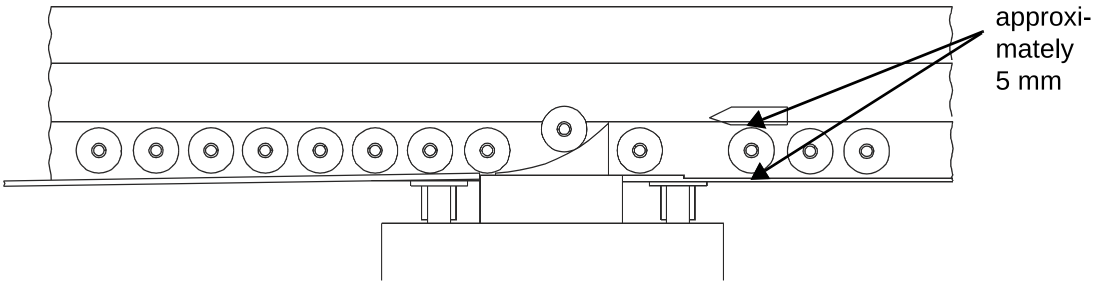
Mechanical requirements for the setting

Vertical adjustment and guide rails

⇒ Mounting the guide rails, page 132

After the rejector the flow of production containers must continue without interruption and without touching the guide rails. Leave about 5 mm spacing between the flow of good containers and the guide rails on the rejector side.

A rejection wedge is delivered with the DELTA-FW. It must be mounted so that its tip is after the rejector and facilitates the container separation. The distance to the good containers should be about 5 mm.



When different container sizes belong to the production program, the guide rails and the position of the rejection wedge must be adapted for a brand change if necessary.

Check the pressure of the compressed-air supply, minimum 6 bar, maximum 10 bar, operating pressure 4 bar.

Adjustment of the bottom photocell

1. Check the function of the photocell.

2. Check the vertical adjustment of the photocell at about 10 to 20 mm above the conveyor.

Entry of parameters

This section describes the setting of general rejector parameters. The parameters which determine the rejector function depending on the conveyor speed are defined with the procedure described in the "Checking the rejector function" section of this chapter.

Change to the **rejector parameter menu** . All following path information is related to this menu.

1. In path 10 enter the variant of the DELTA-FW used:

The serial number is stamped in the bottom sheet at the rear side of the rejector.

DELTA-FW	10 segments	1
DELTA-FWa	10 segments	2 (designation: M prior the serial number)
DELTA-FWb	10 segments	7 (designation: SM prior the serial number)
DELTA-FW	16 segments	3
DELTA-FWa	16 segments	4 (designation: M prior the serial number)
DELTA-FWb	16 segments	8 (designation: SM prior the serial number)
DELTA-FWa Fast	10 segments	10 (designation: M prior the serial number) for higher capacities (> 1.2 m/second) with round containers
DELTA-FWb Fast	10 segments	11 (designation: SM prior the serial number) for higher capacities (> 1.2 m/second) with round containers

2. In path 6 enter the value 1 for the bottom photocell.

1 = photocell switch-on

Change to the **masking of input signals menu** , path 1. Bit 1 (2nd bit from right) of the inputs 1 to 8 indicates the switching direction of the bottom photocell.

1. Does the photocell switch?
   Interrupt the optical path; the signal must change then.

2. Is the switching direction correct?
   Photocell covered = signal LOW (the dot disappears from the display).

3. Is the signal not LOW?

   Press the ▽ key to invert the mask for bit 1.

Checking the connection of the DELTA-FW rejector

The following check is necessary to ensure the correct wiring of the multiwire cable of the DELTA-FW rejector:

1. Change to the **mask output signals menu** in path 1. The outputs 1-8 display the masks for the first eight segments of the DELTA-FW. The outputs 9-16 in path 2 display the masks for the segments 9 to 16.

Clear the rejection area in front of the segments for this function check!

2. Change the masks of the individual segments and thus the switching direction.

   Press this ▽ key in order to change the value from 0 to 1 or vice versa.

3. The selected segment must extend or retract accordingly. If the number of the segment is not the same as the moving segment of the rejector, there must be a wiring error.
   (⇒ Installation, DELTA-FW (optional), page 224).

Measures in case of malfunctions:
- check the connections,
- check the air pressure,
- replace the solenoid at the rejector.

4. Reset the masks of the individual segments and consequently the switching direction to the original condition.

   Press this ▽ key in order to change the value from 0 to 1 or vice versa.

DELTA-K (optional)

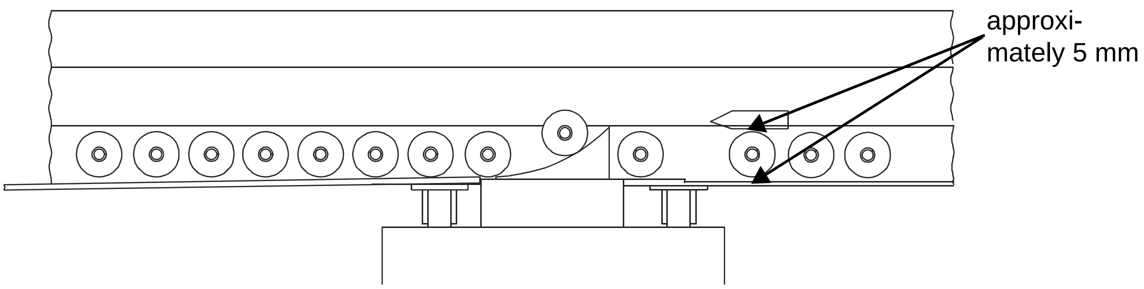
Mechanical requirements for the setting

Vertical adjustment and guide rails

⇒ Mounting the guide rails (optional), page 140

After the rejector the flow of production containers must continue without interruption and without touching the guide rails. Leave about 5 mm spacing between the flow of good containers and the guide rails on the rejector side.

A rejection wedge is delivered with the DELTA-K. It must be mounted so that its tip is after the rejector and facilitates the container separation. The distance to the good containers should be about 5 mm.



When different container sizes belong to the production program, the guide rails and the position of the rejection wedge must be adapted for a brand change if necessary.

Check the pressure of the compressed-air supply, minimum 6 bar, maximum 10 bar, operating pressure 3 bar.

Adjustment of the bottom photocell (if available)

1. Check the function of the photocell.

2. Check the vertical adjustment of the photocell (in the middle of the extended segments).

Entry of parameters

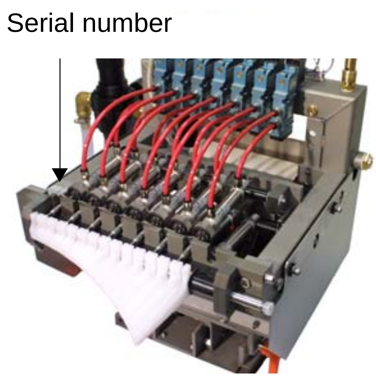
This section describes the setting of general rejector parameters. The parameters which determine the rejector function depending on the conveyor speed are defined with the procedure described in the "Checking the rejector function" section of this chapter.

Change to the **rejector parameter menu** . All following path information is related to this menu.

1. In path 10 enter the variant of the DELTA-K used:

DELTA-K	5
DELTA-Ka	6 (designation: M prior the serial number)
DELTA-Kb	9 (designation: SM)

The serial number is stamped in the segment support on the side of the short segments.



2. In path 6 enter the value 1 for the bottom photocell.
1 = photocell switch-on

Change to the **masking of input signals menu** , path 1. Bit 1 (2nd bit from right) of the inputs 1 to 8 indicates the switching direction of the bottom photocell.

1. Does the photocell switch?
   Interrupt the optical path; the signal must change then.

2. Is the switching direction correct?
   Photocell covered = signal LOW (the dot disappears from the display).

3. Is the signal not LOW?

   Press the ▽ key to invert the mask for bit 1.

Checking the connection of the DELTA-K rejector

The following check is necessary to ensure the correct wiring of the multiwire cable of the DELTA-K rejector:

1. Change to the **mask output signals menu** in path 1. The outputs 1-8 display the masks for the first eight segments of the DELTA-K. The outputs 9-16 in path 2 display the masks for the segments 9 to 16.

Clear the rejection area in front of the segments for this function check!

2. Change the masks of the individual segments and thus the switching direction.

   Press this ▽ key in order to change the value from 0 to 1 or vice versa.

3. The selected segment must extend or retract accordingly. If the number of the segment is not the same as the moving segment of the rejector, there must be a wiring error.
   (⇒ Installation).

Measures in case of malfunctions:
- check the connections,
- check the air pressure,
- replace the solenoid at the rejector.

4. Reset the masks of the individual segments and consequently the switching direction to the original condition.

   Press this ▽ key in order to change the value from 0 to 1 or vice versa.

mono (optional)

Mechanical requirements for the setting

Vertical adjustment and guide rails

⇒ Mounting the guide rails, page 149

Adjust the guide rails in such a way that the containers slightly contact the approach section prior to the rejection segment. In this way the containers are slightly moved to the side thus reducing the friction on the conveyor.

Check the pressure of the compressed-air supply, minimum 6 bar, maximum 10 bar, operating pressure 4 bar.

Entry of parameters

Change to the **rejector parameter menu** . All following path information is related to this menu. There are two different parameters.

1. In path 8 enter the drive time in [ms]
   The drive time is the reaction time required by the segment in order to be set in motion from the rest position. The time is determined by the components handled and the air pressure in the system. When the rejector installation was exactly carried out according to the instructions, the preset standard value (10 ms) can be used without any change. Regarding the rejector function ⇒ "Checking the rejector function" section mono/pusher, page 273.

This value is a device parameter and valid for all container programs.

2. In path 7 enter the stand time in [ms]
   Stand time is the time during which the segment remains activated for a rejection process. This time is dependent on the conveyor speed and the container diameter. It can be obtained as follows:

   Stand time [ms] = half container diameter [mm] / max. speed [m/s]

   As maximum speed is considered the highest conveyor speed used for the production of this container while considering the prescribed limit speed of 1.5 m/s. Input limits: 1 to 250, default value: 25.

pusher (optional)

Mechanical requirements for the setting

Vertical adjustment and guide rails

⇒ Mounting the guide rails, page 152

Adjust the guide rails so that the cans pass as close as possible to the rubber bumper without touching it.

Check the pressure of the compressed-air supply, minimum 6 bar, maximum 10 bar, operating pressure 4 bar.

Entry of parameters

Change to the **rejector parameter menu** . All following path information is related to this menu. There are two different parameters.

1. In path 8 enter the drive time in [ms]
   Drive time is the reaction time the bumper needs to be set in motion from its idle position. The time is determined by the components handled and the air pressure in the system. When the rejector installation was exactly carried out according to the instructions, the preset standard value (10 ms) can be used without any change. Regarding the rejector function ⇒ "Checking the rejector function" section mono/pusher, page 273.

This value is a device parameter and valid for all container programs.

2. In path 7 enter the stand time in [ms]
   Stand time is the time during which the bumper remains activated for a rejection process. This time is dependent on the conveyor speed and the container diameter. It can be obtained as follows:

   Stand time [ms] = half container diameter [mm] / max. speed [m/s]

   As maximum speed is considered the highest conveyor speed used for the production of this container while considering the prescribed limit speed of 1.5 m/s. Input limits: 1 to 250, default value: 25.

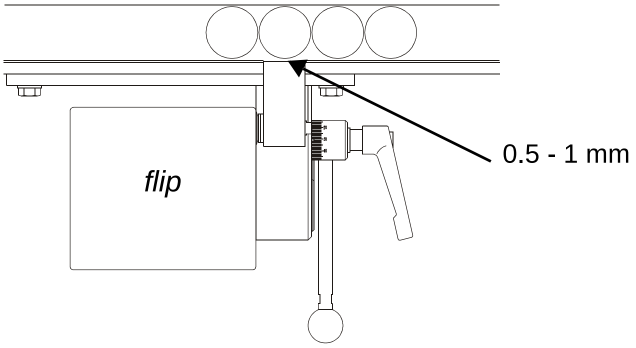
flip (optional)

Mechanical requirements for the setting

Vertical adjustment and guide rails

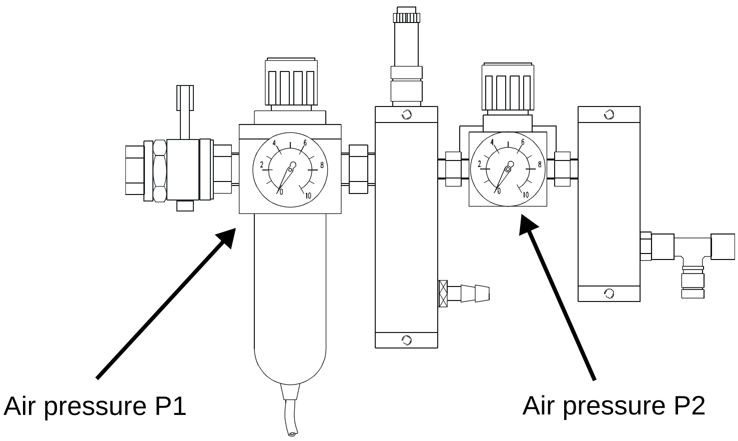
⇒ Mounting the guide rails, page 156

During the mounting, the horizontal adjustment device of the *flip* rejector must be set in such a way that good containers passing the segment will not get in touch with it. However, the distance between container and segment must be within a range between 0.5 and 1 mm.



Checking the distance setting

1. Check the setting of the compressed air, minimum 6 bar, maximum 10 bar supply pressure.
2. Set the compressed air P1 to 4 bar and the compressed air P2 to 3.8 bar.



3. Switch on the conveyor and select the lowest speed level. Send a faulty container through the detection module(s) and check whether the segment hits the centre of the faulty container so that it will be safely rejected.
If the container is not correctly hit, the distance between trigger and rejector segment must be changed in path 27 of the **distances menu**:

If the segment extends before the container arrives enter a larger distance.

If the segment extends after the container has arrived enter a smaller distance.

4. Carry out the test repeatedly until the faulty container will be reliably rejected.

RB *basic* V8.00

Entry of parameters

Change to the **rejector parameter menu** . All following path information is related to this menu.

Checking the setting of the pilot control times

The pilot control time is the time period required from the emission of the output signal to the beginning of the rejection procedure. This time is controlled in dependence on the speed.

1. In path 14 enter a pilot control time for "valve down" of 23 [ms].

2. In path 15 enter a pilot control time for "valve up" of 23 [ms].

3. In path 16 enter a shifting value of the drive control of 0 [ms].

For the check the conveyor must be switched on.
Remove containers from the rejection area. Adhere to the safety regulations!

4. Switch on the conveyor and adjust the conveyor speed to the maximum speed.

5. Check whether in path 17 the value "0" indicating "piston down" is displayed.
If the value "0" is not displayed send a faulty container trough the detection module(s). Thereafter, the value "0" for "piston down" must be displayed in path 17.

6. Send two faulty containers through the detection(s) and observe the first rejection in doing so. The pilot control time for "valve upwards" has to be adjusted if the first container is not hit correctly. In this case the following applies:

If the segment is extended	
before the container reaches the segment	⇒ reduce the pilot control time in path 15
after the container has already passed the segment	⇒ increase the pilot control time in path 15

7. Thereafter, let again pass two faulty containers through the detection module(s) and watch the impact on the first rejection.

8. Repeat this procedure (numbers 5 to 7) until the faulty containers are rejected correctly.

9. Check whether the value "1" indicating "piston up" is displayed in path 17.
If the value "1" is not displayed send a faulty container trough the detection module(s). Thereafter, the value "1" for "piston up" must be displayed in path 17.

10. Send two faulty containers through the detection(s) and observe the first rejection in doing so. If the first container is not correctly hit the pilot control time for "valve down" must be corrected as follows: In this case the following applies:

If the segment is extended	
before the container reaches the segment	⇒ reduce the pilot control time in path 14
after the container has already passed the segment	⇒ increase the pilot control time in path 14

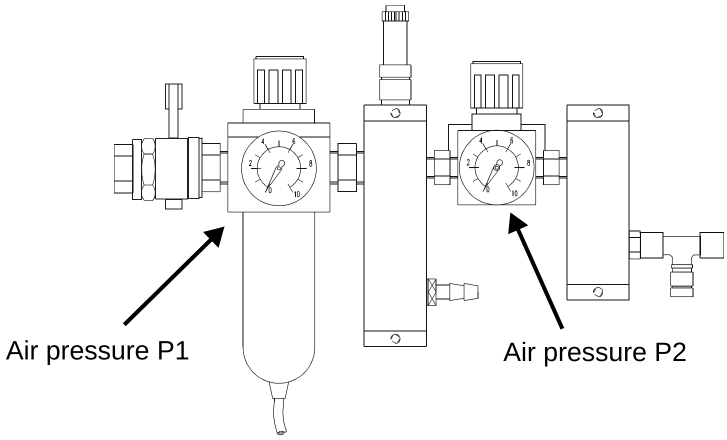
11. Thereafter, let again pass two faulty containers through the detection module(s) and watch the impact on the first rejection.

12. Repeat this procedure (numbers 9 to 11) until the faulty containers are rejected correctly.

Adjustment of the rejection path

By means of the compressed-air supply the rejection path can be determined. The higher the air pressure the longer the rejection distance of the containers. Two successive rejections are controlled by a piston movement cycle. During the 1st rejection process the cylinder piston extends, during the 2nd rejection the cylinder piston retracts.

Two different air pressure settings are used for extending and retracting. There is always a pressure difference between P1 (for extending) and P2 (for retracting).



1. Let two faulty containers pass through the detection module(s) and watch the rejection. Simultaneously check if the rejection path is of sufficient length. The rejection path is generally correct when the container is shifted 10 mm above the position of the rejection wedge.

If the rejection path shall be extended the compressed-air supply of both regulators must be increased. The rejection path can be shortened by reducing the compressed-air supply. Steps 2 through 5 describe how the length of the rejection path can be optimised.

2. Check whether in path 17 the value "0" indicating "piston down" is displayed. If the value "0" is not displayed send a faulty container through the detection module(s). Thereafter, the value "0" for "piston down" must be displayed in path 17.

3. Send two faulty containers through the detection(s) and observe the first rejection in doing so. The "air pressure P1" has to be corrected if the first container is not rejected as desired. In this case the following applies:

if the container is not rejected far enough	⇒ increase "air pressure P1"
if the container is rejected too far	⇒ reduce "air pressure P1"

   Thereafter, let again pass two faulty containers through the detection module(s) and watch the impact on the 1st rejection.
   Repeat this procedure (steps 2 and 3) until the containers are correctly rejected.

4. Check whether in path 17 the value "0" indicating "piston down" is displayed. If the value "1" is displayed send a faulty container through the detection module(s). Thereafter, the value "0" must appear.

5. Send two faulty containers through the detection(s) and observe the second rejection in doing so. The "air pressure P2" has to be corrected if the second container is not rejected as desired. In this case the following applies:

if the container is not rejected far enough	⇒ increase "air pressure P2"
if the container is rejected too far	⇒ reduce "air pressure P2"

   Thereafter, let again pass two faulty containers through the detection module(s) and watch the impact on the 2nd rejection.
   Repeat this procedure (steps 4 and 5) until the containers are correctly rejected.

6. Write down the obtained pressure values P1 and P2 for the Condensed Manual.

Distance checks

Main trigger up to the DELTA-FW/DELTA-K rejector

For the check the conveyor must be switched on.
Remove containers from the rejection area. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Select a low conveyor speed.

3. Carry out test 1:

    1. Interrupt the optical path of the bottom photocell permanently.
       All rejector segments will extend.

Even when the photocell is no longer interrupted, the segments will only retract when a good container passes the rejector.

    2. Put a good container with already entered container parameters onto the conveyor prior the main trigger and let it pass the check area.

Function check

When the functions of the bottom photocell and the DELTA-FW/DELTA-K are correct, exactly those segments will retract where the container passes and will extend again afterwards. The container must not be rejected and must continue straight on the conveyor without touching a segment.

In case of malfunctions correct the distance entry.

» Container touches an extended segment:
  reduce the entered value.

» Container is touched by an extending segment after the passage:
  increase the entered value.

Optimising the setting

In order to achieve the optimum setting carry out the following additional test:

    1. Change the distance value in both directions until the above mentioned malfunctions occur.

    2. Obtain the average of both values, the result is the optimum value. Enter this value.

4. Clear the optical path of the bottom photocell.

5. Carry out test 2:

   The "sampling" function (rejection of containers in blocks) is a simple means to check the rejector.

    1. Start the sampling procedure (⇒ Operator's Manual, operating chapter, "Sampling").

    2. Put a defined number of containers, at least 1 more than the desired number for sampling, in close contact to each other on the conveyor prior to the main trigger and let them pass the rejector.

When the function is correct, the entered number of containers must be properly rejected.

In case of malfunctions correct the distance entry:

» Rejection is too late:
reduce the entered value.

» Rejection is too early:
increase the entered value.

In order to achieve the optimum setting the following additional test can be made:

1. Change the distance value in both directions until the above mentioned malfunctions occur.

2. Obtain the average of both values, the result is the optimum value. Enter this value.

6. Switch off the conveyor.

Main trigger to the rejectors *mono/pusher*

For the check the conveyor must be switched on.
Remove containers from the rejection area. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Select a low conveyor speed.

3. Carry out the test:

   The "sampling" function (rejection of containers in blocks) is a simple means to check the rejector.

   1. Start the sampling procedure (⇒ Operator's Manual, operating chapter, "Sampling").

   2. Put a defined number of containers, at least 1 more than the desired number for sampling, in close contact to each other on the conveyor prior to the main trigger and let them pass the rejector.

Function check

In case of a correct function the entered number of containers must be properly rejected and the extending segment must hit the containers in their centre.

In case of malfunctions correct the distance entry:

» Rejection is too late:
reduce the entered value.

» Rejection is too early:
increase the entered value.

Optimising the setting

In order to achieve the optimum setting carry out the following additional test:

   1. Change the distance value in both directions until the above mentioned malfunctions occur.

   2. Obtain the average of both values, the result is the optimum value. Enter this value.

4. Switch off the conveyor.

Rejector function check

DELTA-FW / DELTA-K

The rejection process of containers from the flow of production is considerably dependent on the kinetic energy of the containers to be rejected and the friction conditions on the conveyor.

For a gentle rejection the number of the segments used therefore depends on the container speed. The device calculates this factor by means of a function which is adapted to the respective local conditions.

The preset standard values (default values) have been determined during long years of experience with this rejector type. They cover a wide range of possible requirements.

An individual fine setting can still increase the quality of the rejection process. The following steps are necessary for the fine setting:

Fine setting

For the check the conveyor must be switched on.
Remove containers from the rejection area. Adhere to the safety regulations!

1. Switch on the conveyor.
2. Select the maximum conveyor speed. Do not exceed the limit speed of 1.5 m/s.
3. In the encoder menu, path 1, read off the indicated actual speed [mm/s]
4. In the rejector parameter menu, path 4, select the maximum switching speed [mm/s]
5. Input value is the actual speed [mm/s] minus 100 mm/s
   (default value = 1400 [mm/s]).

This value is a device parameter and thus the same for all programs.

6. Use the "sampling" function to reject single containers at the maximum speed.
   Carry out the sampling with variable container types. Use always a filled and an empty sample of the production container for the rejection.
7. In the rejector parameter menu, path 2, enter the minimum number of segments (default value = 5). The input value must be changed until the proper rejection of all different sample containers is possible. That means the light containers must not be rejected too far and the heavy containers must be rejected for a sufficient distance from the flow of good containers.

Containers bouncing back from the opposite guide rails as well as containers stopped by the rejection wedge can considerably obstruct the flow of production containers.

When a setting for all container types cannot be obtained, the guide rails must be adjusted according to the container type.

This value is a device parameter and the same for all programs.

8. Set the conveyor to the minimum speed.
9. In the encoder menu, path 1, read off the indicated actual speed [mm/s]

10. In the **rejector parameters menu**, path 3, select the minimum switching speed [mm/s].

11. Enter the actual speed [mm/s] plus 100 mm/s
(default value = 300 [mm/s]).

This value is a device parameter and the same for all programs.

12. In the **rejector parameters menu**, path 1, select the maximum number of segments (default value DELTA-FW = 10/16, DELTA-K = 16). The input value must be changed until the proper rejection of the respective production containers is possible. The containers must be removed far enough from the flow of good containers.

This value depends on the program and can be defined separately for every production container in different programs.

13. Switch off the conveyor.

mono/pusher

The rejection of containers must be unobstructed at all conveyor speeds. Therefore, it must be checked after device commissioning whether all requirements are fulfilled. The procedure is based on the assumption that the encoder setting and the distance inputs for the rejector have been checked at a low conveyor speed.

For the check the conveyor must be switched on.
Remove containers from the rejection area. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Select the maximum conveyor speed. Do not exceed the limit speed of 1.5 m/s.

3. Use the "sampling" function to reject single containers at the maximum speed.
   Carry out the sampling with variable container types. Use always a filled and an empty sample of the production container for the rejection.

4. Check whether the rejected containers are hit in their centre.

When, at high conveyor speeds, the containers are hit too late, the drive time must be increased until the containers are hit in the centre. Thereafter, the distance input must be checked again at a low conveyor speed.
When, at high conveyor speeds, the containers are hit too early, the drive time must be reduced and the distance input must be checked again.

The drive time is a device parameter and the same for all programs.

5. If the containers are hit at the right time, they must be separated neatly from the stream of production containers by the rejector.

When the containers are not rejected far enough, the stand time value must be increased.

The kinetic energy of the containers depends on the conveyor speed. Therefore, the effect of the new setting must be checked at clearly different conveyor speeds after each modification of a value.

Function check of counters

For the check the conveyor must be switched on.
The safety regulations must be observed!

1. Switch on the conveyor.

2. Clear the counters (⇒ Operator's Manual, operating chapter).

3. Check different container types.

   The "sampling" function (rejection of containers in blocks) is a simple means to check the counters.

   1. Start the sampling procedure (⇒ Operator's Manual, operating chapter, "Sampling").

   2. Put a defined number of containers, at least 1 more than the desired number for sampling, in close contact to each other on the conveyor prior the main trigger and let them pass the check area.

4. Check the counter reading, for this purpose change to the **Display/Clearing of counters menu** .

Path 1	total counters
Path 2	good containers
Path 3	rejected containers
Path 18	sampled containers

Sampled containers are also counted as rejected containers, that means the counters 1, 3 and 18 are increased.

Function check

Check whether the corresponding counters have been increased correctly.
In case of malfunctions ⇒ Trouble shooting, page 347.

5. Switch off the conveyor.

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Function check of the work/rest switch

For the check the conveyor must be switched on.
The safety regulations must be observed!

1. Switch on the conveyor.

2. Check different container types.
   The "sampling" function (rejection of containers in blocks) is a simple means to check the rejector.

   1. Start the sampling procedure (⇒ Operator's Manual, operating chapter, "Sampling").

   2. Put a defined number of containers, at least 1 more than the desired number for sampling, in close contact to each other on the conveyor prior the main trigger and let them pass the check area.

3. The entered number of containers will be rejected.

4. Press the work/rest switch.

   1. Start the sampling procedure (⇒ Operator's Manual, operating chapter, "Sampling").

   2. Put a defined number of containers, at least 1 more than the desired number for sampling, in close contact to each other on the conveyor prior the main trigger and let them pass the check area.

5. None of the containers will be rejected.
   The system emits the message 4 0 2 1.
   The warning light changes to red.

6. Release the work/rest switch.
   The rejector is activated again, the message is reset, the warning light status goes back to green (if there is no other message).

7. Switch off the conveyor.

The settings for the additional triggers will be carried out after testing the detection modules.

Detection modules

General

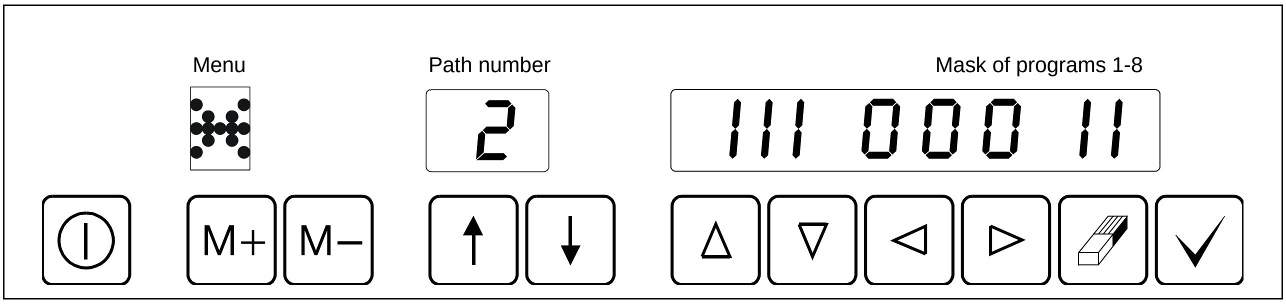
All detection modules must be commissioned in single procedures for every container program. This includes:

- » The mechanical adjustment of measuring bridges, photocells and additional triggers to the respective container height.
- » Checking of sensor signals.
- » Activation of the respective detection module in the **detection and reject definitions menu** .
- » Entry of detection parameters in the corresponding menu. The operator must consider two different types of parameters. On the one hand, they are device parameters which are applicable for the respective detection module in all programs and which must only be entered once. On the other hand, they are program parameters which are dependent on the corresponding container type and which must be entered individually for every program.
- » Checking the function of detection modules.

Program activation

The program selection is described in the Operator's Manual. Every desired program must be selected before starting commissioning.

For this purpose select the **definition of container programs menu** , path 2 or 3. Path 2 includes from right to left the programs 1 to 8, path 3 the programs 9 to 16. Only those programs are available for selection in the "program selection/brand change" menu which have the value 1 in the mask of the "definition of container programs" menu. All programs with the value 0 cannot be selected. The current program cannot be deactivated.



External program change (module brands, external program change)

When the "Brands, external program change" module is part of the device, an external program change via a program select switch by the customer is also possible beside the manual program selection via the front panel of the control unit. The brand select switch permits to choose 16 programs via a coded 4-bitsignal. However, only one of the two options can be active at a time.

The desired option can be selected in the **definition of container programs menu** , path 4.

Entered value 0:	manual selection
Entered value 1:	external selection

Also in case of the external program selection, only activated programs can be selected. The program change is independent from the menu selected at a time. The system accepts the selected program two seconds after the last change of the input signals.

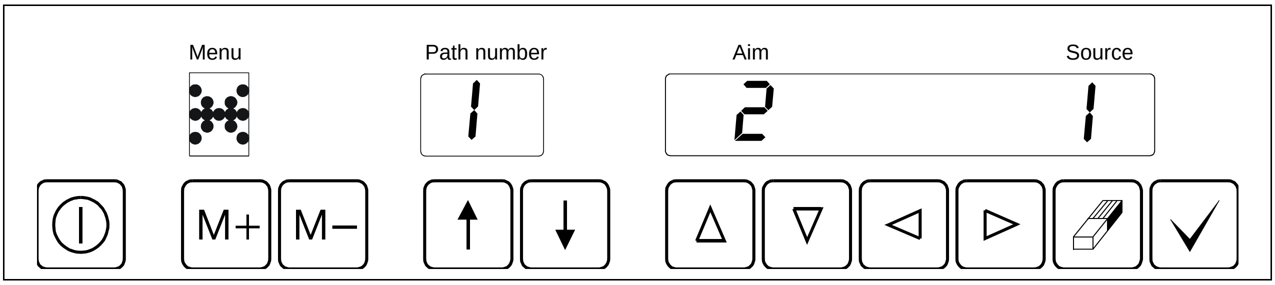
The system emits a message (⇒ Messages, page 351) when the operator has selected an inadmissible program. The current program will remain active until the operator selects another authorised program.

Copying program data to another program

It is possible to copy all program data of a particular program to another program. This may be useful when different programs vary only by few parameters.

For this purpose change to the **program selection/brand change menu** and select the target program to which data are to be copied.

In the **definition of container programs menu** select path 1. select path 1. The left side displays the current program, the right side displays the source program from which the data are to be taken. The system accepts the data after the confirmation with the key. The previous data will be overwritten.



Loading of default values

The original program parameters (programmed during manufacturing) can at any time be loaded into the current container program.

For this purpose change to the **definition of container programs menu**, path 1, and enter the value 0.

The system accepts the default data after the confirmation with the key. The previous data will be overwritten.

Closure detections (optional)

General

Different sensor types are available to fulfil the various tasks for the detection of closures. Their distinction depends on the type of containers and the type of closures:

inductive; bottles	presence
inductive; cans	presence
optical	presence
excessive height	excessive height
pressure	container pressure (too high, too low), presence, excessive height
foil	presence
sonic	presence, canted closure, leaking closure
optical empties	presence

Closure presence check (optional)

General

The various sensor types for the respective containers differ by:

» their function principle (⇒ Closure detection (BA), page 54),

» the mounting (⇒ Mounting the measuring bridge, page 105),

» the electrical installation (⇒ Closure detection (BA), page 184)

» and the mechanical adjustment as described in the following.

However, the processing of signals obtained by the detection modules and their evaluation is the same for all sensor types except for those of the closure detections, pressure and *sonic*:

1. The sensor signal must be in the LOW condition when a closure is present.

2. Within the entered length for the measuring window located symmetrically around the middle of the closure, the system counts the chain cycle signals during the LOW condition of the sensor signal.

3. The counted value of the conveyor cycle pulses is compared with the entered limit values.

4. If the counted value is between the limits or identical with one of the limit values the container will be classified as "good" in case of a pulse evaluation = "good", otherwise it will be classified as "faulty". In case of a pulse evaluation = "faulty" the procedure is reversed.

The closure detections, pressure and *sonic* include additional checks and are described in separate sections.

The foil closure detection has the same function as a label detection. Refer to the corresponding paragraph for commissioning instructions.

Check of sensor signal for closure presence

Change to the **mask input signals menu** , path 1, bit 2 (3rd from right) displays the closure detection optical/inductive.

1. Does the sensor switch?
   Interrupt the optical path, the signal must change.

2. Is the switching direction correct?
   Closure presence = signal LOW (dot disappears from the display).

3. Is the signal not LOW?
   Invert the mask for bit 2.

Mechanical adjustment of the closure presence sensor

Stop the conveyor and lock it out to prevent inadvertent switch-on!

1. Put a container below the measuring bridge.

2. Conveyor guide rails:
   Adjust the guide rails in such a way that the container below the measuring bridge has a maximum lateral tolerance of 5 mm on both sides.

3. Horizontal adjustment:
   Position the measuring bridge so that the sensor is exactly above the middle of the closure.

4. Vertical adjustment:
   The main trigger and the closure detection sensor have been mounted at the correct distance to each other during factory assembly.

The function of the closure detection is ensured when the sensor adjustment is completed.

As different materials and container shapes could influence the measuring ranges of sensors, it may be necessary to change the vertical adjustment. For this purpose loosen the sensor, readjust it and tighten it again, repeat the adjustment procedure for the sensor as made before.

The optimum measuring distance depends on the sensor type and is between the following values for the different sensors:

inductive, bottles	10 - 15 mm
inductive, cans	3 - 5 mm
optical	20 - 25 mm
optical empties	60 - 80 mm

Activation of the closure presence sensors

In the **detection and reject definition menu** **,** , path 11, enter the value 1 for closure presence in order to activate the detection.

Entry of the detection parameters for closure presence

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Change to the **closure detection parameters menu** . All following path information is related to this menu.

3. In path 1 enter the length of the measuring window [mm] for closure presence.
   The value must be lower than the closure diameter. The presence of foam may influence the detection of closures. It may be necessary to reduce the size of the measuring window in order to increase the detection reliability.

4. In path 2 set the pulse evaluation.

Inductive and optical	Set the pulse evaluation to 1, "good" (default value). A container is evaluated as good if the sensor switches when a closure is present.
Optical empties	Set the pulse evaluation to 0, "bad" (default value). A container is evaluated as faulty if the sensor switches when a closure is present.

5. In path 5 select the display of the last measured value.

6. Put some containers with and without closures on the conveyor prior the main trigger, let them pass the closure detection and compare the measured values.

Function check

The results may deviate in case of different container types but the result must ensure a clear distinction between good containers and faulty containers.

In case of malfunctions correct the detection sensor as follows:

» Too large deviations:
check the vertical adjustment.

7. In paths 3 and 4 adapt the limit values if necessary:
By means of the measured values for containers with and without closures select the area of chain cycle pulses within which containers with closures are measured.

Path 3:	Lower limit for the number of pulses in case of containers with closures.
Path 4:	Upper limit for the number of pulses in case of containers with closures.

Checking the closure presence function

1. In path 5 select the display of the last measured value.

2. Place several good containers and faulty containers on the conveyor before the main trigger and check whether the system rejects the containers with fill level faults. Check the inputs for the limit values and the vertical adjustment.

3. Change to the **display counter readings menu** , path 11, and check whether the counter has been correctly increased.

4. Switch off the conveyor.

Excessive height (optional)

General

This detection module is able to detect the following faults and to control the rejection of containers with such faults from the flow of production containers:

» canted closure

» battered cans

» too tall containers

Function

A photocell installed just above the closure is used as sensor. A container is evaluated as faulty when the photocell switches. The processing of the signals provided by the detection module and their resulting evaluation is as follows:

1. The sensor signal must be in the LOW condition when a closure is present.

2. Within the entered length for the measuring window located symmetrically around the middle of the closure, the system counts the chain cycle signals during the LOW condition of the sensor signal.

3. The counted value of the conveyor cycle pulses is compared with the entered limit values.

4. If the counted value is between the limits or identical with one of the limit values the container will be classified as "good" in case of a pulse evaluation = "good", otherwise it will be classified as "faulty". In case of a pulse evaluation = "faulty" the procedure is reversed.

Checking the sensor signal for excessive closure height

Change to the **mask input signals menu** , path 1, bit 7 (extreme left) displays the closure detection for excessive height.

1. Does the photocell switch?
   Interrupt the optical path; the signal must change then.

2. Is the switching direction correct?
   Closure presence = signal LOW (dot disappears from the display).

3. Is the signal not LOW?
   Invert the mask for bit 7.

Mechanical adjustment of the excessive height sensor

Stop the conveyor and lock it out to prevent inadvertent switch-on!

1. Put a container below the measuring bridge.

2. Conveyor guide rails:
   Adjust the guide rails in such a way that the container below the measuring bridge has a maximum lateral tolerance of 5 mm on both sides.

3. Vertical adjustment:
   The photocell is mounted to the trigger measuring bridge above the photocell for the main trigger. The vertical distance to the trigger photocell is at least 15 mm. If a lower excessive height is to be checked, the height of the measuring bridge must be reduced accordingly. Recheck the function of the trigger photocell. Check the input for the neck diameter at the height of the trigger.

The function of the detection module is ensured when the trigger photocell adjustment is completed.

Activation of the excessive closure height

In the **detection and reject definitions menu** , path 12 for excessive closure height, enter the value 1 in order to activate the detection.

Entry of the detection parameters for excessive height

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Change to the **closure detection parameters menu** . All following path information is related to this menu.

3. In path 6 enter the length of the measuring window [mm] for excessive closure height.
   The value corresponds approximately to the closure diameter. The presence of foam may influence the detection of closures. It may be necessary to reduce the size of the measuring window in order to increase the detection reliability.

4. In path 7 set the pulse evaluation to 0 "bad".
   That means the switching of the sensor in case of a too high closure results in a container evaluation as "faulty".

5. In path 10 select the display of the last measured value.

6. Put some containers with canted closures, correct closures or without closures on the conveyor prior the main trigger, let them pass the closure detection and compare the measured values.

Function check

The results may deviate in case of different container types but the result must ensure a clear distinction between good containers and faulty containers.

In case of malfunctions correct the detection sensor as follows:

» Too large deviations:
check the vertical adjustment.

7. Adapt the limit values in paths 8 and 9 if necessary.

Checking the function of the excessive height

1. In path 10 select the display of the last measured value.

2. Place several good containers and faulty containers on the conveyor before the main trigger and check whether the system rejects the containers with fill level faults. Check the inputs for the limit values and the vertical adjustment.

3. Change to the **counter readings menu** , path 12, and check whether the counter has been correctly increased.

4. Switch off the conveyor.

Pressure measurement (optional)

General

The pressure sensor permits to carry out different checks at the same time.

» Pressure too high or too low in a container

» Closure presence

» Canted closures

Every function can be activated or deactivated individually.

Measurement takes place along the centre line of a container. Faults can only be detected when a container is aligned accordingly. As a result, not all of the faulty containers can be detected and rejected!

The sensor sensitivity considerably depends on the closure material. The corresponding setting must be made on location.

Function

An inductive proximity sensor effects a distance measuring between the sensor and the middle of a closure. The system is able to compensate for container height tolerances by comparing the result with those obtained at the edge of the closure. The module obtains the closure deformation which allows conclusions regarding the pressure within the container. The module can measure vacuum as well as overpressure.

The evaluation of the measuring results depends on the type of the check.

Pressure check

The minimum or the maximum measured value around the middle of the closure can be obtained in a fixed programmed environment. Generally, the minimum value will be obtained because the closure deformation is in downward direction for the vacuum check. Even in case of the pressure check for cans with an opening clip, there must be a clear minimum in the middle of the lid. For other purposes it may be necessary to obtain the maximum value.

Canted closure

The system calculates the difference between both values measured at the edges of a closure. If the difference is greater than a programmable limit value, the container is evaluated as faulty. In this case, the determining factors are the measuring points at the edges of the programmable length of the measuring window located symmetrically around the middle of the closure.

Presence

In case of a correctly adjusted sensor, the measured value 0 corresponds to an infinite distance or a non-metal surface. This status is considered as missing closure.

Front panel display

Every path always displays either one display value or one input value so that the allocation is clear. The only exception is path 18 "measured value pressure / canted closure" in the closure detection parameter menu. In this case, the left side displays the measured value for pressure measuring and the right side the measured value for a canted closure.

Checking the sensor signal for pressure measurement

Change to the **measured values fill level/pressure menu** , path 6. All following path information is related to this menu. Hold a metal object closely below the sensor. The measured value must change clearly.

Mechanical adjustment of the pressure measurement sensor

Stop the conveyor and lock it out to prevent inadvertent switch-on!

1. Put a container below the measuring bridge.

2. Conveyor guide rails:
   Adjust the guide rails in such a way that the container below the measuring bridge has a maximum lateral tolerance of 5 mm on both sides.

3. Horizontal adjustment:
   Position the measuring bridge so that the sensor is exactly above the middle of the closure.

4. Vertical adjustment:
   The sensor is mounted to the trigger measuring bridge. First carry out a rough adjustment as follows: Adjust the bridge so that the distance between the sensor and a closure is

for tin plate	4 mm (+/- 2 mm),
for aluminium	2 mm (+/- 1 mm).

As different materials and container shapes could influence the measuring range of the sensor, it may be necessary to change the vertical adjustment. For this purpose loosen the sensor from the measuring bridge, readjust it and tighten it again. Then repeat the adjustment procedure for the sensor. Check the inputs for the neck diameter at trigger height and correct them if necessary.

5. Fine adjustment in path 6.

   1. Put a good container (medium height) exactly below the middle of the sensor.

   Define for every container type whether a vacuum **or**an overpressure measurement is to be given priority. Set the measuring bridge according to this decision.

   2. For vacuum measurement adjust the bridge so that a value of approximately 80 is displayed.

   3. For overpressure measurement adjust the measuring bridge so that
      a value of approximately 160 is displayed.

6. Check the distance.
   The pressure detection must be positioned very exactly. Proceed as follows to check the input for the distance:

   The distance check requires conveyor operation. Adhere to the safety regulations!

   1. Switch on the conveyor.

   2. Change to the **closure detection parameters menu** . All following path information is related to this menu.

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3. In path 13 enter the closure diameter [mm].

4. In path 18 read off the value for canted closure (right).

5. Check a container with a correct closure several times in the check area.

Function check

In case of containers with a correctly positioned closure, the measured value for canted closure (right side of display) should have an average of about 0 (+/- 20 points).

In case of malfunctions correct the detection sensor as follows:

» Results are always definitely larger or smaller:

Check the distance input in the **definition of distances menu** , path 22. Increase or reduce the distance value step by step.

Activation of the closure detection, pressure

Activate the detection in the **detection and reject definition menu** by entering the value 1 in path 11 for closure presence, path 12 for canted closure and path 14 for container pressure.

Entry of the detection parameters for pressure measurement

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Change to the **closure detection parameters menu** . All following path information is related to this menu.

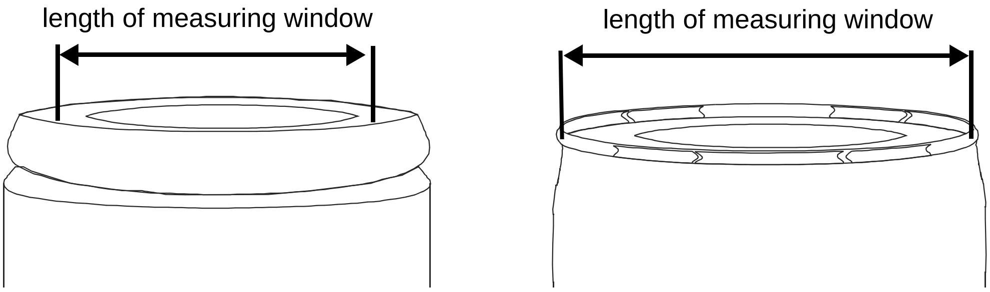
3. Paths 11 and 12 display the measuring range limits of the sensor [mV].
The default values (150 in path 11, 530 in path 12) correspond to the setting of the AD converter module T188-AD (HBE 010195 ST) after compensation and sealing in the factory. A change of this setting is not required.

The input values may only be changed when the settings on the printed circuit board are changed accordingly. Otherwise, the function of the detection module is not reliable.

These values are device parameters and are valid for all container programs.

However, all following parameters of this menu depend on the program and must be obtained and entered for every container program.

4. In path 13 enter the length of the pressure measuring window [mm].
Distance between the raised positions at the edges of a closure used as reference values for the evaluation of the measurement (e.g. the value 58 mm must be entered for standard cans).



Container pressure

5. In path 16 enter the evaluation mode.
Deformation of the good containers determines the input:
curved inwards: 0 (= minimum)
curved outwards: 1 (= maximum)

6. In path 18 read off the displayed measured value for pressure (left).

7. Put several containers with correct pressure and those with overpressure or vacuum on the conveyor prior the main trigger and check whether the faulty containers are correctly rejected.

8. Compare the results with the display and check the counters.

9. In paths 15 or 14 check the inputs for the limit value of overpressure and vacuum and adapt them if necessary.

Closure presence

No further inputs are required.

Canted closure

10. In path 18 read off the displayed value for canted closure (right).

11. Put some containers with canted closures and some with correct closures on the conveyor prior the main trigger and compare the measured values.

12. In path 17 check the input for the limit value canted closure and adapt this value if necessary.

Checking the function of pressure measurement

1. Select the respective display in the **measured values fill level/pressure menu** , path 3, 4 or 5.

2. Place several good containers and faulty containers on the conveyor before the main trigger and check whether the system rejects the containers with fill level faults.

3. Compare the result with the corresponding display in path 3, 4 or 5.

4. Check in the **counter readings menu** , path 11, 12, 13 or 14, whether the respective counters have been correctly increased.

5. Switch off the conveyor.

HEUFT *sonic* (optional)

General

The sensor permits to effect different checks simultaneously:

» closure presence
» canted closures
» leaking containers

Function

This detection excites the closure by means of an electromagnetic pulse and analyses the acoustic response signal from the closure. The pitch of the excited closure is dependent on its bulging or its tension as a function of container inside pressure.

The evaluation software obtains the characteristic values from the signal and compares the results with the programmable limit values. Faulty containers are detected and rejected from the stream of good containers.

Front panel display

Two values are displayed simultaneously in several path of the **parameters of the closure detection *sonic*** menu. In most cases, a measured value is displayed at the left and a limit value at the right.

Setting of the microphone gain

1. Adjust the measuring bridge in such a way that the distance between the sensor and the closure of a production container is 3 mm.

2. Change to the **parameters of the closure detection *sonic*** menu, path 8.

3. Select trigger source "internal" by entering "1". Set all other values to the default values (⇒ Parameter sheets). If a default value cannot be entered, first enter the next default value and then return to the initial path (for some entries the paths are logically linked so that illogical entries are not possible).

4. In the **detection and reject definitions menu** deactivate all detection modules ("0").

5. Stop the conveyor and put a good container below the measuring bridge so that the centre of the closure is below the centre of the sensor.

6. Change to path 12.
   Check the measured value of the amplitude (left value in the display). The value should be 100 to 120. In case of a deviating value adapt the microphone gain in path 2 (default value = 128). If the value is lower than 100, enter a higher microphone gain value. If the value is higher than 120, enter a lower microphone gain value.
   Change the microphone gain until the measured amplitude value attains 100 to 120.

7. Remove the container from below the measuring bridge and measure (path 12 left) the noise amplitude (measured amplitude value without a container). The measured amplitude value should now be lower than 20. If the value is higher than 30, the reason for the noise must be determined by means of an oscilloscope (⇒ Storage oscilloscope, page 298).

Entry of distances

1. Change to the **masking of input signals menu** , path 3.

2. Check the main trigger input (bit 0, right): mask = 0, the dot must go out when interrupting the light beam.

3. Change to the **parameters of the closure detection *sonic*** menu, path 8.

4. Set the trigger source to "normal" by entering "0".

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

5. Switch on the conveyor.

6. In the **definition of distances menu** , path 22, enter 24 mm as distance between the main trigger and the measuring bridge.

7. Change to the **parameters of the closure detection *sonic*** menu, path 1.

8. The entered default value of the delay distance for crown corks is "40" (approximate diameter 28 mm). The delay distance s must be changed for other closure diameters d:

   s = 26 mm + (d/2)

A modification becomes only effective after the next measured container. Only the second measurement after a modification of data is correct.

The entry can be checked with a testing procedure:

1. Enter "24" (mm) as delay distance in path 1.

2. In path 12 on the left side of the display read the measured amplitude value of a test container and write down this value. Effect several measurements with the same test container.

3. Increase the delay distance in steps of 2 mm, write down the delay distances and the amplitudes (path 12 left). This procedure is intended to obtain the maximum amplitude.

4. As delay distance s select the middle between the two points where the amplitude has each time dropped by approximately 30 points (departing from the maximum value). This value should be approximately coincident with the delay distance at which the maximum amplitude was attained.

delay distance (in mm)	24	26	28	30	32	34	36	38	40	42	44	46	48	50
amplitude	20	15	20	40	60	80	105	112	110	104	90	70	44	20

This example results in a maximum amplitude of 112 with a delay distance of 38 mm. The amplitude is approximately 30 points lower with delay distances of 34 mm and 44 mm. The middle between these two distances is 39 mm. This value had to be entered in path 1 as delay distance for this example.

Defining the positions of measuring windows

The obtained delay distance results normally in a good function of the detection module. The optimum parameters can be obtained by means of the frequency measurement and the energy measurement.

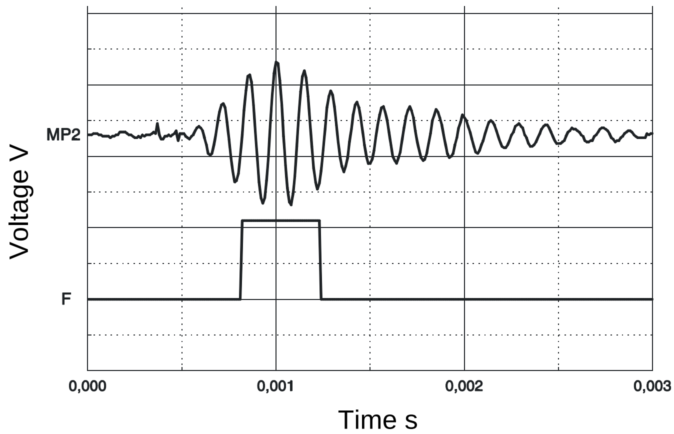
Use only good containers from the current production for the determination of the parameters. Containers which have been produced some time ago have generally another pressure, another temperature or slight damages at the closures, facts which may lead to false results.

Frequency measurement

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. In the **parameters of the closure detection menu*sonic*** , path 15 right, enter "0" in order to deactivate the tracking function.
2. In path 7 set the start threshold to 50.
3. In path 12 check the microphone gain, ⇒ Setting of the microphone gain, page IV-47.
4. In path 3 set the start of the frequency measurement to 1.
5. In path 4 set the end of the frequency measurement to 3.
6. Let some good containers be measured by the detection module ten times: in path 15 (left) watch the measured frequency values.
7. **Either:** The frequency of every single container deviates only within a maximum range of 100 Hz, use the entered parameters and effect the energy measurement (⇒ next page).

   or: The frequency deviates within a range of more than 100 Hz, effect additional measurements:



Typical signal flow with start threshold and corresponding start and end of frequency measurement

The most probable reason is the shifting of the start position of a measuring window. This happens when the start threshold is at an unfavourable position to the signal. In this case, an improvement can be achieved by the following measure:

8. In path 7 reduce the start threshold in steps of five units (40, 35, 30) until 30. Let some good containers be measured by the detection module ten times: in path 15 (left) watch the measured frequency value. When the frequency deviates only within a maximum range of 100 Hz continue with the energy measurement.

9. Additional measurements are required when the frequency still deviates within a range of more than 100 Hz:

   Set the end of the frequency measurement to 2. Let some good containers be measured by the detection module ten times: in path 15 (left) watch the measured frequency values.
   When the frequency deviates only within a maximum range of 100 Hz continue with the energy measurement.

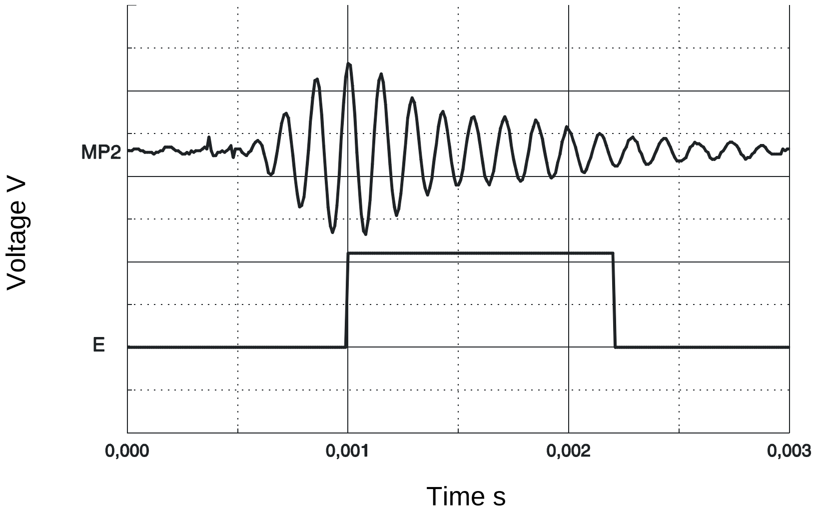
When all these measures are unsuccessful, the result of the measurement must be analysed with an oscilloscope: ⇒ Storage oscilloscope, page 298.

Energy measurement

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. In path 5 set the start of the energy measurement to 200. This value corresponds to a time of 0.8 ms after the main trigger.

2. In path 6 set the length of the energy measurement to 300. This corresponds to a time period of 1.2 ms.



3. Let some good containers be measured by the detection module ten times: in path 13 (left) watch the measured energy value.
   The values for good containers should not drop below "100".

4. When the measured values for good containers are lower than 100, reduce the start point of the energy measurement in path 5 until all good containers achieve values above 100.

This setting requires the correct selection of the microphone gain in order to ensure the correct signal modulation ⇒ Setting of the microphone gain, page 291.

Definition of rejection limits

The default values of the limits can only be used to a limited extent because the signal parameters on location are unknown and depend on many factors. In order to achieve a good setting of limit values, several containers with faults must be compared with containers of the normal production.

If **one** rejection limit has been determined, write down **this** rejection limit and **do not** change it again for the following measurements of other limit values. This means do not attempt to determine two limit values at the same time.

Determination of the amplitude threshold

This rejection limit is used to detect containers without closures.

1. In path 2 check the microphone gain, ⇒ Setting of the microphone gain, page 291, paragraph 6.

Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

2. Open the cover of the casing.

After switch-off with the main power switch, the mains supply cable has still live voltage!

3. Check the dead voltage condition (terminals 1 and 3 at the main power switch).
4. Remove the white lead of cable W1410 from the terminal 5 at terminal strip X208 by using the lever (special tool, ⇒ Page 174).
5. Close the cover of the casing.
6. Switch on the device with the main power switch.
7. Let production containers pass through the detection module.
8. In path 12 left read the measured amplitude value (of the noise signal) during production. This value is generally lower than 10 points.
9. Add 10 points to the highest measured amplitude value of the noise signal. Enter this value in path 12 right as amplitude threshold, ⇒ Setting of the microphone gain, page 291, paragraph 6.

Highest measured amplitude value = 8. Amplitude threshold: 8 + 10 = 18 (points).

Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

10. Open the cover of the casing.

After switch-off with the main power switch, the mains supply cable has still live voltage!

11. Check the dead voltage condition (terminals 1 and 3 at the main power switch).
12. Connect the white lead of cable W1410 at the terminal 5 at terminal strip X208.
13. Close the cover of the casing.

For the function check it is necessary to switch on the conveyor.
The safety regulations must be observed!

14. Switch on the device with the main power switch.

15. Check the device function with containers. For this purpose check the measured amplitude value in path 12 left.

Determination of the correct limit value for frequency too low

The lower limit of the frequency is the most important rejection limit for leaking containers and canted closures.

The measuring procedure requires conveyor operation.
The safety regulations must be observed!

1. In path 10 right enter a limit value for frequency too low of 5000 (Hz).
2. In path 13 of the **detection and reject definitions menu** activate the detection module (enter "1").
3. Send a good container through the detection module during production.
4. Increase the limit value for frequency too low step by step in increments of 150 Hz until the first good containers will be rejected.
5. Thereafter reduce the limit value by 300 Hz in order to ensure a safety buffer to good containers.

General notes

Closure faults (leakers or bullnoses) occur very rarely. Therefore, the rate of false rejections must be kept extremely low.

In practice rejected containers which do not have a visible closure fault (leakers) are not evaluated as faulty when they pass through the module again. Presumably, the rejection process and the following container movement or placing increases the inside pressure which leads to a wrong measurement result. A much better test method is to put the rejected containers completely submerged into a bath of warm water during a period of 20 minutes. This measure will increase the inside pressure. Air bubbles can be seen escaping from the closure area of leaking containers.

When no correct signal evaluation is possible, the system displays a number code (0 000 - 0 004) in the display of the measured frequency in path 15 left.

0 000	The signal has not exceeded the amplitude threshold at any position (= no further evaluation), check the distance between sensor and closure
0 001	No signal (= microphone faulty or interruption to the signal path)
0 002	Frequency too low (4.000 Hz) (only critical with good containers)
0 003	Frequency too high (10.000 Hz) (only critical with good containers)
0 004	The acoustic evaluation card does not signal that the measurement of values is completed, check the entries of distance and delay distance

Determination of the limit value for frequency too high

⚠ The measuring procedure requires conveyor operation.
The safety regulations must be observed!

1. In path 11 right enter a limit value for frequency too high of 10.000 Hz.
2. In path 14 of the **detection and reject definitions menu** activate the detection module (enter "1").
3. Send a good container through the detection module during production.
4. Reduce the limit value for frequency too high step by step in increments of 500 Hz until the first good containers will be rejected.
5. Thereafter increase the limit value by 1000 Hz in order to ensure a safety buffer to good containers.

Determination of the limit value for energy too low

⚠ The measuring procedure requires conveyor operation.
The safety regulations must be observed!

1. In path 13 right enter a limit value for energy too low of 30.
2. In path 12 of the **detection and reject definitions menu** activate the detection module (enter "1").
3. Send a good container through the detection module during production.
4. Increase the limit value for energy too low step by step in increments of 10 points until the first good containers will be rejected.
5. Thereafter reduce the limit value by 20 points.

Determination of the limit value for energy too high

⚠ The measuring procedure requires conveyor operation.
The safety regulations must be observed!

1. In path 14 enter a limit value for energy too high of 1000.
2. Send a good container through the detection module during production.
3. Reduce the limit value for energy too high step by step in increments of 50 points until the first good containers will be rejected.
4. Thereafter increase the limit value by 100 points.

Commissioning of the tracking function

The tracking ensures that smaller possible fluctuations during the course of production, for example due to an increase in temperature, which can influence the measured values are compensated. For this purpose, the device checks the average value of the last 1024 containers. When the average value is different from the entered reference value, the control unit corrects the measured values accordingly.

The tracking function can be established when the measuring windows have been adapted to meet the conditions, the rejection limits have been defined and the device function is satisfactory:

1. In path 16 enter "1" in order to start the formation of average values.
   Thereafter, the display in path 16 returns to "0".

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

2. Switch on the conveyor.

3. Send at least 1024 containers of the current production through the measuring bridge.
   The system recalculates the average value after eight measurements each.

4. In path 17 left read the average frequency value and enter it in the same path at right as dynamic reference frequency.

5. In path 15 right enter "1" in order to activate the dynamic tracking of the frequency.

The extent of the fluctuation of the average value is displayed in path 18. At the left is displayed the minimum and at the right the maximum value of the average frequency.

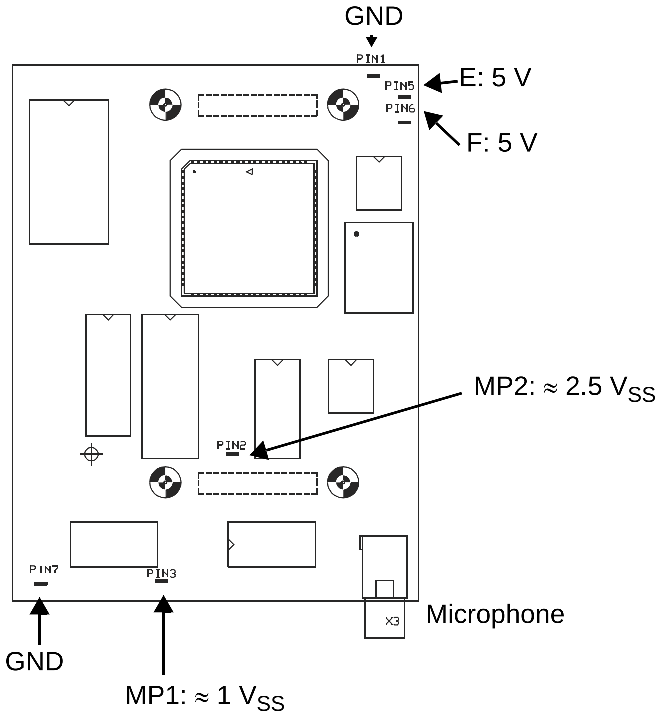
If a satisfactory function has not been achieved with this setting, a new definition of the measuring windows should be tried. If these measures are not satisfactory, contact HEUFT company for further advice.

Storage oscilloscope

The described procedure permits the commissioning of the closure detection *sonic* in standard situations. However, it is helpful for a qualified specialist to use a 2-channel storage oscilloscope in order to evaluate more exactly the signal flow and the relative position of measuring windows.

For this purpose, the printed circuit board T188-SON is provided with the following measuring points:

MP1: Signal at the output of the microphone amplifier (after 10 kHz low pass)
MP2: Signal after filtering (6 kHz high pass) and amplification as it is accepted from the AD converter.
F: Frequency measuring window
E: Energy measuring window



Fill level detection (BA)

Fill level detection HF (optional)

General

One measuring bridge is sufficient to measure underfills and overfills when the appropriate software is available. The system compares the measured value with two limit values, a lower limit for underfills and, optionally, the upper limit for overfills.

There are limits regarding the container dimensions. The container diameter at fill level must not exceed 70 mm. In case of the KT variant, the distance from the upper edge of the closure to the normal fill level (nominal fill level) must not exceed 70 mm, this limit is 120 mm for the LT variant.

Check of the sensor signal from the HF measuring bridge

Change to the **fill level parameter menu** , path 9, for the current HF frequency. The display is in [kHz], e.g. 25,000 = 25 MHz. When attenuating the signal by holding a hand in the measuring bridge, the displayed value must considerably decrease by 100 - 200 kHz.

Mechanical adjustment of the HF measuring bridge

1. Put a container below the measuring bridge.

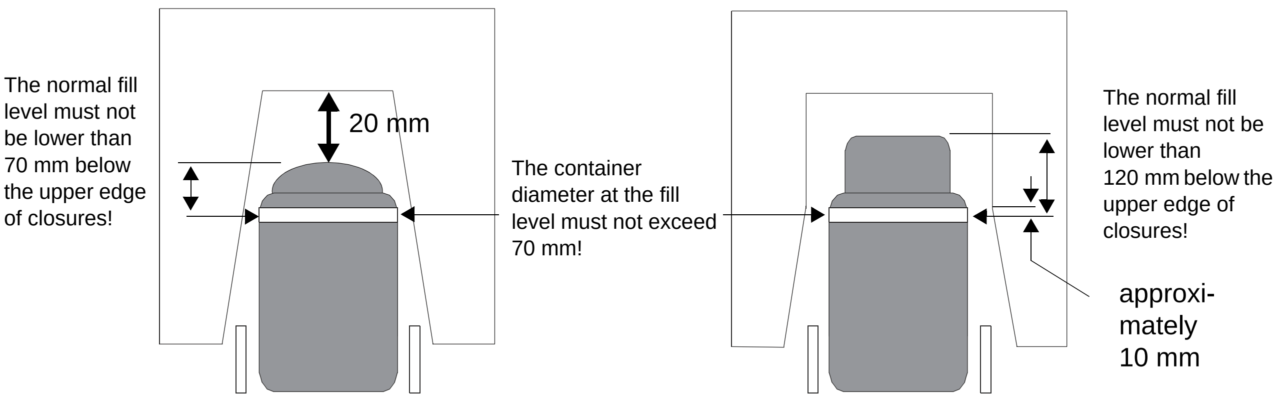
2. Conveyor guide rails:
   Adjust the guide rails in such a way that the container below the measuring bridge has a maximum lateral tolerance of 5 mm on both sides.

3. Horizontal adjustment:
   Position the measuring bridge so that the container is exactly below the middle of the measuring bridge.

4. Vertical adjustment:
   This adjustment depends on the variant of the measuring bridge:

   KT variant:
   The distance from the lower edge of the measuring bridge to the closure is 20 mm.

   LT variant:
   The normal fill level is 10 mm below the bend in the measuring bridge.



HBE210042, KT, HF measuring bridge, short **HBE210042, LT, HF measuring bridge, long**

Activating the HF fill level detection

In the **detection and reject definition menu** , path 4 for underfills and path 5 for overfills enter the value 1 in order to activate the detection module.

Entry of parameters for the HF fill level detection

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Change to the **fill level detection parameters menu** . All following path information is related to this menu.

3. **Underfill check**
   In path 1 enter the length of the measuring window for underfills in units of [mm].
   The value must be smaller than the diameter at the nominal fill level. Approximate values of about 30% to 50% of the diameter at nominal fill level.

4. Change to path 3 to display the last measured value.

5. Put several containers with a normal fill level and underfilled containers on the conveyor prior the main trigger.

6. Compare the measured values with the limit value and adapt the limit value in path 2 if necessary.

7. **Overfill**
   The length of the measuring window is the same as for underfill measuring in path 1.

8. Change to path 3 to display the last measured value.

9. Put several containers with a normal fill level and underfilled containers on the conveyor prior the main trigger.

10. Compare the measured values with the limit value and adapt the limit value in path 5 if necessary.

Function check of the HF measuring bridge

1. In path 3 select the display of the last measured value.

2. Place several good containers and faulty containers on the conveyor before the main trigger and check whether the system rejects the containers with fill level faults.

3. Compare the result with the display of the last measured value.

4. If the distinction between good containers and faulty containers is not sufficient, the vertical adjustment of the measuring bridge must be optimised, i.e. the height must be reduced a bit. For the KT variant, the distance to the upper edge of the closure should not be less than 15 mm.

5. In the **counter readings menu** , paths 4 and 5, check whether the corresponding counters have been correctly increased.

6. Switch off the conveyor.

Fill level detection Gamma (optional)

General

One measuring bridge is required each for underfill and overfill measurement.
A gap value reference rate must be obtained during commissioning to enable a correct evaluation of measurement results. This ensures that measured values higher than 1 are available for processing.

Radioactivity!
Close the radiation area with the shutter switch. DO NOT put your hands in the radiation area unless the green light is on (shutter closed). The orange light (in GB: red) is out in this case.
ONLY persons trained and licensed by HEUFT Company for repair of radioactive devices are authorised to open the measuring bridge.
If desired, especially trained HEUFT service personnel will carry out installation.
Special care is required for the installation and the test of the shutter monitoring circuit (closing of the radiation window)!

For safety reasons every measuring bridge is equipped with a shutter that closes the radiation window. This shutter can be operated manually by the two shutter switches installed at the conveyor. When both switches are in position "1", radiation area open, the shutter will automatically be opened when the device is started and will be automatically closed when the device is switched off. The radiation window remains closed if one of the switches is in position "0".
The shutter status is displayed by an orange/green Gamma warning light (in Great-Britain: red/green).

green warning light:	shutter closed
orange (in GB: red) warning light:	shutter open

If the shutter is closed even though the detection is switched on and containers pass through the measuring bridge, the system emits the fault message "Gamma measuring bridge inactive" (⇒ Messages, page 351).

If the option "automatic shutter control" is activated, the radiation area will be closed for every gap between containers of a programmed length and will only be opened again immediately before the arrival of the next container.

The container dimensions are subject to the following limitations:
The container diameter in the bridge area is limited to 90, 110 or 130 mm due to the passage width of the respective measuring bridge. The container diameters must be at least 10 mm smaller than the passage width of the corresponding measuring bridge as the containers require a lateral guidance tolerance of 5 mm on each side.
The distance from the upper edge of a closure to the normal fill level (nominal fill level) is limited to maximum 80 mm.

Check of the sensor signal from the Gamma measuring bridge

1. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

Radioactivity!
DO NOT put your hands in the radiation area.

2. In the **fill level detection parameters menu** , path 9 or 12, select the display of the actual Gamma frequency for underfill or overfill.
   The displayed unit is kHz, e.g. 80 = 80 kHz. When attenuating the signal by placing a container below the measuring bridge, the displayed value must decrease considerably.

Mechanical adjustment of the Gamma measuring bridge

⚠ Stop the conveyor and lock it out to prevent inadvertent switch-on!

1. Set both shutter switches to position "0", the green light comes on.

2. Place a container below the measuring bridge.

3. Conveyor guide rails:
   Adjust the guide rails in such a way that the container below the measuring bridge has a maximum lateral tolerance of 5 mm on both sides.

4. Horizontal adjustment:
   Position the measuring bridge so that the container is exactly below the middle of the measuring bridge.

5. Vertical adjustment:
   Adjust the measuring bridge so that the middle of the measuring window is approximately at the limit fill level for this container.
   In case of cans or other containers where the fill level is not visible from the outside, adjust the measuring bridge as follows:

   1. Put a container which is filled to the nominal fill level below the measuring bridge.

   2. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

Radioactivity!
DO NOT put your hands in the radiation area.

   3. Select path 9 or 12 in order to display the current frequency.

   4. Raise the measuring bridge so far that the radiation area is no longer interrupted by the container.

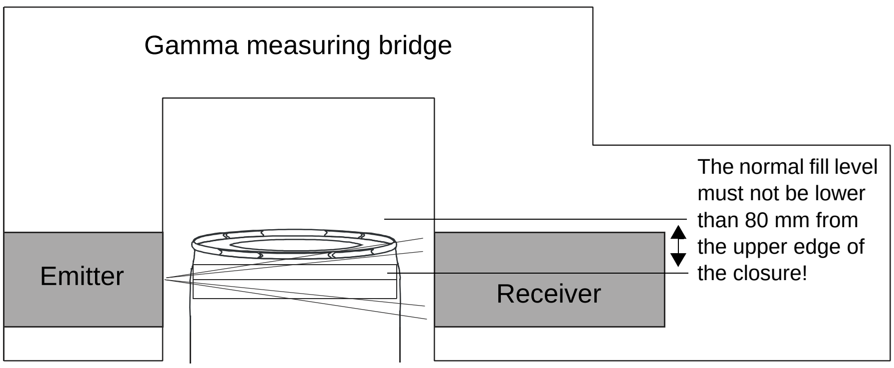
   5. Write down the measured value (for example 80 [kHz]).

   6. Slowly lower the measuring bridge until the displayed value stabilises at a lower value, e.g. 25 [kHz]. The radiation area is then completely interrupted by the liquid within the container.

   7. Write down the measured value.

   8. Raise the measuring bridge until the measured value is slightly below the average of both values obtained previously, e.g. 45 - 50 [kHz].

   9. With this vertical adjustment, overfilled or underfilled containers will produce values slightly above the lower or slightly below the upper measured value.



RB *basic* V8.00

Activating the Gamma fill level detection

In the **detection and reject definition menu** , path 4 for underfills and path 5 for overfills enter the value 1 in order to activate the detection module.

Entry of parameters for the Gamma fill level detection

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.
2. Change to the **fill level detection parameters menu** . All following path information is related to this menu.
3. In path 15 enter the value 1 in order to activate the automatic shutter control circuit.
4. In path 16 enter the gap size (in mm) as of which the shutter will be automatically closed.

This value is a device parameter and valid for all container programs.

Underfill

5. Select path 8 (maximum frequency) and enter the value "0".
6. Set both shutter switches to position "0", the green light comes on.
7. Remove the container from below the measuring bridge.
8. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

Radioactivity!
DO NOT put your hands in the radiation area.

9. Carry out the gap measuring, i.e. interrupt the main trigger with a hand. Repeat the measuring several times.
10. Add 10 % to the maximum value displayed in path 3.
11. Enter this value in path 13 as gap value reference rate for underfills.

This value is a device parameter and valid for all container programs.

12. In path 1 enter the length of the measuring window for underfills in units of [mm].
    The value should be approximately 40% to 60% of the container diameter at the nominal fill level.
13. In path 3 select the display of the last measured value.
14. Compare the measured values of containers with a normal fill level and underfilled containers.
15. In path 2 adapt the limit value if necessary.

Overfill

16. Select path 11 (maximum frequency) and enter the value "0".

17. Set both shutter switches to position "0", the green light comes on.

18. Remove the container from below the measuring bridge.

19. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

Radioactivity!
DO NOT put your hands in the radiation area.

20. Carry out the gap measuring, i.e. interrupt the main trigger with a hand. Repeat the measuring several times.

21. Add 10 % to the maximum value displayed in path 6.

22. Enter this value in path 14 as gap value reference rate for overfills.

This value is a device parameter and valid for all container programs.

23. In path 4 enter the length of the measuring window for overfills in units of [mm].
The value should be approximately 40% to 60% of the container diameter at the nominal fill level.

24. In path 6 select the display of the last measured value.

25. Compare the measured values of containers with a normal fill level and overfilled containers.

26. In path 5 adapt the limit value if necessary.

Function check of the Gamma measuring bridge

Fill level detection

1. In path 3 or 6 select the display of the last measured value for underfills or overfills.

2. Place several good containers and faulty containers on the conveyor before the main trigger and check whether the system rejects the containers with fill level faults.

3. Compare the measured values with the display in path 3 or 6.

4. In the **counter readings menu**, paths 4 and 5, check whether the corresponding counters have been correctly increased.

Shutter closing function

5. Close the shutter with the shutter switches. The warning light must change to green.

6. Send several containers through the detection area.

7. Check in path 17 for shutter faults whether the counter increases correctly.

Automatic shutter control function

8. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

Radioactivity!
DO NOT put your hands in the radiation area.

9. Put several containers in close contact to each other on the conveyor prior the main trigger. Then create a gap in the flow of containers. The length of the gap must at least be equal to the value entered in path 16 of the **fill level detection parameters menu** .

10. The shutter must automatically close after the corresponding distance and the warning light must change to green.

11. The shutter must automatically open when the next container arrives. The warning light changes to orange (in GB: red).

12. Switch off the conveyor.

X-ray fill level detection module

General

One measuring bridge is required each for underfill and overfill measurement.
A gap value reference rate must be obtained during commissioning to enable a correct evaluation of measurement results. This ensures that measured values higher than 1 are available for processing.

X-radiation!
Close the radiation area with the shutter switch. DO NOT put your hands in the radiation area unless the green light is on (shutter closed). The orange light (in GB: red) is out in this case.
ONLY persons trained and licensed by HEUFT Company for the repair of x-raying devices are authorised to open the measuring bridge on the emitter side. If desired, especially trained HEUFT service personnel will carry out installation. Special care is required for the installation and the test of the shutter monitoring circuit (closing of the radiation window)!

For safety reasons every measuring bridge is equipped with a shutter that closes the radiation window. This shutter can be operated manually by the two shutter switches installed at the conveyor. When both switches are in position "1", radiation window open, the shutter will automatically be opened during device start-up and will be automatically closed when the device is switched off. The radiation window remains closed if one of the switches is in position "0".
The shutter status is displayed by an orange/green X-ray warning light (in Great-Britain: red/green).

green warning light:	shutter closed
orange (in GB: red) warning light:	shutter open

If the shutter is closed even though the detection is switched on and containers pass through the measuring bridge, the system emits the fault message "X-ray measuring bridge inactive" (⇒ Messages, page 351).

If the option "automatic shutter control" is activated, the radiation area will be closed for every gap between containers of a programmed length and will only be opened again immediately before the arrival of the next container.

The container dimensions are subject to the following limitations:
The container diameter in the bridge area is limited to 90, 110 or 130 mm due to the passage width of the respective measuring bridge. The container diameters must be at least 10 mm smaller than the passage width of the corresponding measuring bridge as the containers require a lateral guidance tolerance of 5 mm on each side.
The distance from the upper edge of a closure to the normal fill level (nominal fill level) is limited to maximum 80 mm.

Sensor signal check of the X-ray measuring bridge

1. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

X-radiation!
DO NOT put your hands in the radiation area.

2. In the **fill level detection parameters menu** , path 9 or 12, select the display of the current frequency for the X-ray underfill or overfill check.
The displayed unit is kHz, e.g. 80 = 80 kHz. When attenuating the signal by placing a container below the measuring bridge, the displayed value must decrease considerably.

Mechanical adjustment of the X-ray measuring bridge

Stop the conveyor and lock it out to prevent inadvertent switch-on!

1. Turn one of the shutter switches to position "0", the green light comes on.

2. Deactivate the automatic shutter monitoring circuit in the fill level detection parameters menu , path 15 by entering "0".

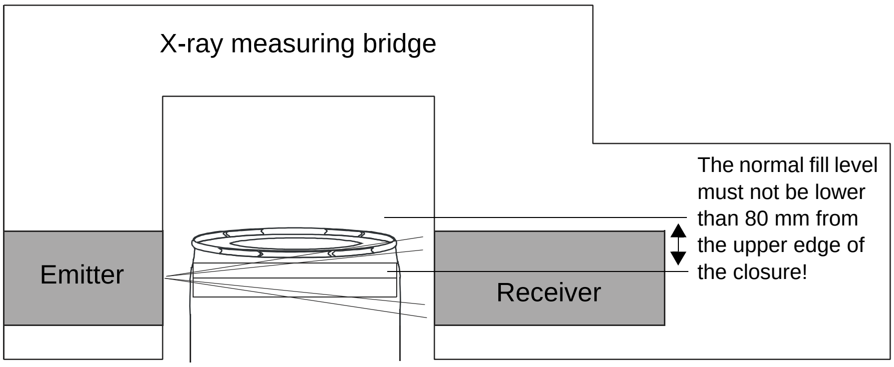
3. Place a container below the measuring bridge.

4. Conveyor guide rails:
   Adjust the guide rails in such a way that the container below the measuring bridge has a maximum lateral tolerance of 5 mm on both sides.

5. Horizontal adjustment:
   Position the measuring bridge so that the container is exactly below the middle of the measuring bridge.

Vertical adjustment (rough):

6. Adjust the height of the measuring bridge in such a way that the centre of the measuring window is approximately at the fill level limit (fill level at which a container is either considered as underfilled or as overfilled).



Vertical adjustment (fine)

7. Verify the rough vertical adjustment as follows.
   This check **should** be carried out for every container type but **must** be carried out to optimise the vertical adjustment for cans or other containers where the fill level is not visible from the outside.

8. Turn one of the shutter switches to position "0".

9. Put an empty container below the measuring bridge.

10. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

X-radiation!
DO NOT put your hands in the radiation area.

11. Select path 9 or 12 in order to display the current frequency.

12. Write down the measured value (for example 70 [kHz]).

13. Turn one of the shutter switches to position "0".

14. Put a completely filled container below the measuring bridge.

15. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

X-radiation!
DO NOT put your hands in the radiation area.

16. Select path 9 or 12 in order to display the current frequency.

17. Write down the measured value (for example 25 [kHz]).

18. Turn one of the shutter switches to position "0".

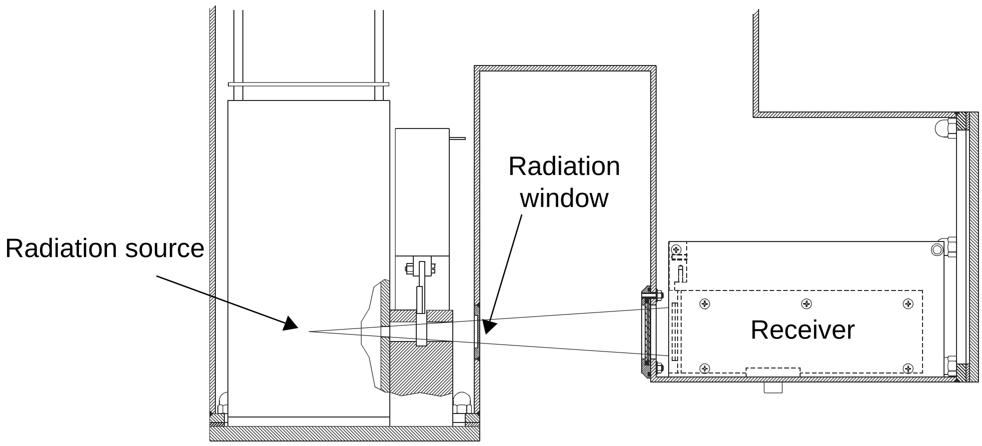
19. Put a container which is filled to the respective limit below the measuring bridge.

20. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

X-radiation!
DO NOT put your hands in the radiation area.

21. Select path 9 or 12 in order to display the current frequency.

22. Correct the height of the measuring bridge until the measured value is slightly below the average value derived from the two previously obtained measured values, for example 45 - 50 [kHz].



23. Check the height again by optical means. The fill level limit should be approximately in the centre of the radiation window. A closure must not protrude into the radiation area.

Activation of the fill level detection X-ray

In the **detection and reject definition menu** , path 4 for underfills and path 5 for overfills enter the value 1 in order to activate the detection module.

Entry of detection parameters for the X-ray measuring bridge

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Change to the **fill level detection parameters menu** . All following path information is related to this menu.

3. In path 15 enter the value "0" in order to deactivate the automatic shutter control.

4. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

X-radiation!
DO NOT put your hands in the radiation area.

Determining the gap value reference rate for underfill

5. Stop the passing of containers below the measuring bridge for about 1 minute and observe the measured value in path 9.

6. Take the mean of the measured values and enter it in path 13 as gap value reference rate.

7. In path 19 enter the value "0" in order to activate the monitoring of the gap value.

8. In path 20 enter the value "0" in order to start the automatic measurement of the gap value.

Entering the length of the measuring window for underfill

9. In path 15 enter the value 1 in order to activate the automatic shutter control.

In Germany, the automatic shutter monitoring circuit must be activated in order to operate the fill level detection X-ray.

10. In path 16 enter the gap size (in mm) as of which the shutter will be automatically closed.

This value is a device parameter and valid for all container programs.

11. Turn both shutter switches to position "1". The orange (in GB: red) warning light comes on when containers pass through the measuring bridge.

X-radiation!
DO NOT put your hands in the radiation area.

12. In path 1 enter the length of the measuring window for underfills in units of [mm].
The value should be approximately 40% to 60% of the container diameter at the nominal fill level.

13. In path 3 select the display of the last measured value.

14. Compare the measured values of containers with a normal fill level and underfilled containers.

15. In path 2 set the limit value to the mean value if necessary.

Determining the gap value reference rate for overfill

16. In path 15 enter the value "0" in order to deactivate the automatic shutter control.

X-radiation!
DO NOT put your hands in the radiation area.

17. Stop the passing of containers below the measuring bridge for about 1 minute and observe the measured value in path 12.

18. Take the mean of the measured values and enter it in path 14 as gap value reference rate.

19. In path 19 enter the value "0" in order to activate the monitoring of the gap value.

20. In path 20 enter the value "0" in order to start the automatic measurement of the gap value.

Entering the length of the measuring window for overfill

21. In path 15 enter the value 1 in order to activate the automatic shutter control.

In Germany, the automatic shutter monitoring circuit must be activated in order to operate the fill level detection X-ray.

22. Turn both shutter switches to position "1". The orange (in GB: red) warning light comes on when containers pass through the measuring bridge.

X-radiation!
DO NOT put your hands in the radiation area.

23. In path 4 enter the length of the measuring window for overfills in units of [mm].
The value should be approximately 40% to 60% of the container diameter at the nominal fill level.

24. In path 6 select the display of the last measured value.

25. Compare the measured values of containers with a normal fill level and overfilled containers.

26. In path 5 set the limit value to the mean value if necessary.

Function check of the X-ray measuring bridge

Fill level detection

1. In path 3 or 6 select the display of the last measured value for underfills or overfills.

2. Place several good containers and faulty containers on the conveyor before the main trigger and check whether the system rejects the containers with fill level faults.

3. Compare the measured values with the display in path 3 or 6.

4. In the **counter readings menu**, paths 4 and 5, check whether the corresponding counters have been correctly increased.

Shutter closing function

5. Close the shutter with the shutter switches. The warning light must change to green.

6. Send several containers through the detection area.

7. In the **counter readings menu** , path 17 for shutter closing faults, check whether the respective counter increases correctly.

Automatic shutter closing function

8. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

X-radiation!
DO NOT put your hands in the radiation area.

9. Put several containers in close contact to each other on the conveyor prior the main trigger. Create a gap in the stream of containers which is at least as long as the value entered in path 16 of the fill level detection parameters menu.

10. The shutter must automatically close after the corresponding distance and the warning light must change to green.

11. The shutter must automatically open when the next container arrives. The warning light changes to orange (in GB: red).

12. Interrupt the stream of containers until the shutter closes (the green warning light comes on).

Automatic measurement of the gap value

13. Switch off the conveyor.

14. Temporarily attach a plastic plate with a thickness of approximately 5 to 10 mm in front of the receiver.

The device does not accept measured values falling below the programmed gap value reference rate (path 13 and 14) by 25 %.

15. Change to path 17 for an underfill measuring bridge or path 18 for an overfill measuring bridge.

16. Switch on the conveyor.

17. Send a container through the measuring bridge.

18. Path 17 or 18 display a new (lower) gap value before the shutter closes again automatically after the container passage.

19. Stop the conveyor and remove the plastic plate from the receiver as soon as the shutter is closed (green warning light comes on).

20. Switch on the conveyor.

21. Send a container through the measuring bridge.

22. The displayed gap value in path 17 or 18 must change again to the previous (higher) value.

23. Observe the measurement of the gap value in the stream of production in path 17 (underfill) or in path 18 (overfill). Note down the gap value.

24. Observe the measurement of the gap value during the passing of single containers in path 17 (underfill) or in path 18 (overfill). Note down the gap value.

25. If the measurement of the gap value in the stream of production differs from the measurement of the gap value during the passing of single containers by more than 4 points, the neck diameter of the container as well as the distances must be checked and adapted.

26. If within a period of 30 minutes there is a permanent lack of gaps which are required for the measurement of the gap value, the time period for the monitoring of the gap value can be prolonged to 4 hours (enter "1" in path 19).

    In path 19 enter the value "2" if no message shall be emitted, in case a measurement of the gap value is not possible.

27. If no automatic measurement of the gap value is possible, this function can be deactivated in path 20 by entering the value 1. This deactivation might, however, result in a reduced stability of the measurement results.

28. Switch off the conveyor.

Fill level detection infrared

The processing of the signals supplied by the detection and the subsequent evaluation of containers is carried out as follows:

1. The sensor signal must be in the LOW condition when the liquid interrupts the light beam of the photocell.

2. Within the entered measuring window length which is located symmetrically around the container centre the conveyor cycle pulses are counted while the sensor signal is in the LOW condition.

3. The counted value of the conveyor cycle pulses is compared with the entered limit values.

4. If the counted value is between the limits or identical with one of the limit values the container will be classified as "good" in case of a pulse evaluation = "good", otherwise it will be classified as "faulty". In case of a pulse evaluation = "faulty" the procedure is reversed.

Sensor signal check

Change to the **masking of input signals menu** , path 2, bit 1 (2nd to the right) for underfill, path 4, bit 5 for overfill.

1. Does the photocell switch?
   Interrupt the optical path; the signal must change then.

2. Is the switching direction correct?
   Liquid detected = signal LOW (spot disappears on the display).

3. Is the signal not LOW?
   Turn the mask.

Mechanical adjustment of the infrared measuring bridge

⚠ Stop the conveyor and lock it out to prevent inadvertent switch-on!

1. Place a container below the measuring bridge.

2. Conveyor guide rails:
   Adjust the guide rails in such a way that the container below the measuring bridge has a maximum lateral tolerance of 5 mm on both sides.

3. Vertical adjustment:
   Adjust the measuring bridge in such a way that
   in case of an **underfill check** the light beam is on the upper edge of the area to be evaluated as "underfilled",
   and in case of an **overfill check** on the lower edge of the area to be evaluated as "overfilled".

Activating the fill level detection infrared

In the **detection and reject definition** menu, path 4 for underfills (optional) and path 5 for overfills (optional) enter the value 1 in order to activate the detection module(s).

Entry of detection parameters for the infrared measuring bridge

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Change to the **fill level detection parameters menu** . All following path information is related to this menu.

   5 paths are available for every detection:
   Paths 21 - 25 for underfill
   Paths 26 -30 for overfill

   The setting for both detection modules is carried out in the same manner in the respective paths ⇒ Parameters of the fill level detection, page 36.

3. Enter the measuring window length in [mm].
   The value must be lower than the diameter of the container at the height of the detection module. A factor of 0.6 multiplied by the neck diameter at the detection height has proven.

4. Enter the pulse evaluation.
   For **underfills**: 1 = good (default value), i.e. the photocell signal is interpreted as correct fill level.
   For **overfills**: 0 = faulty (default value), i.e. the photocell signal is interpreted as overfill.

5. Enter the lower limit for the number of pulses by means of the table:
   for **underfills** in path **23**,
   for **overfills** in path **28**:

Neck diameter in mm	up to 20	25	30	35	40	45	50	55	as from 60
Number of pulses	3	4	6	7	9	10	12	13	15

Function check of the infrared measuring bridge

1. Change to the path of the display of last measured values (path 25 for underfill check, path 30 for overfill check).

2. Place several containers with correct and incorrect fill levels on the conveyor before the main trigger and check whether the incorrectly filled containers are rejected.

3. In the **display of counter readings menu** , check whether the counters have been correctly increased in path 4 for underfills or in path 5 for overfills.

4. Switch off the conveyor.

Bottle Burst check (optional)

Entry of the number of containers to be rejected with a risk of glass fragments

Precautionary rejection of bottles filled in the area of the burst bottle in order to avoid the passing of bottles containing glass fragments into the stream of production.
During three revolutions a certain number of containers is rejected. Two optional settings are available for this purpose.

1. Change to the **definition of count signals menu** , path 15.

2. Enter the desired setting "0" or "1":

Setting:	"0"		"1"	
	Number of containers		Number of containers	
Revolution 1	3	Burst position each with one adjacent container	5	Burst position each with two adjacent containers
Revolution 2	1	Burst position	3	Burst position each with one adjacent container
Revolution 3	1	Burst position	1	Burst position

Residual liquid detection (VF)

Residual liquid detection HF (optional)

General

This detection module is used to measure the amount of residual liquid within containers. The system compares the highest measured value obtained within a measuring window, after the subtraction of a reference value (the average of the measured values obtained at the ends of the measuring windows), with a programmable limit value. When this limit value is exceeded, there is too much residual liquid in a container and the corresponding container is evaluated as faulty.

Signal check of the residual liquid detection HF

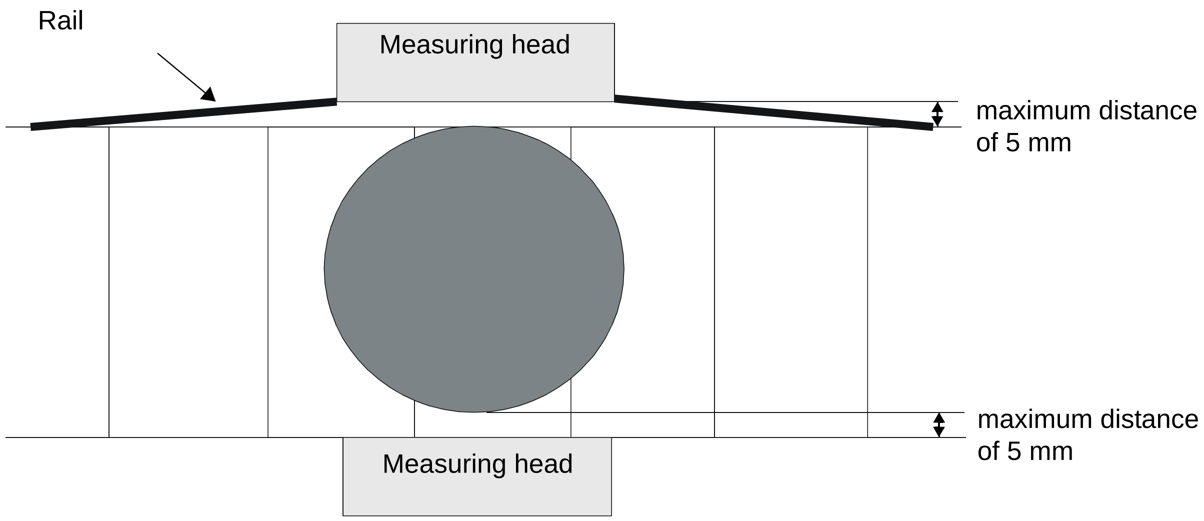
The **display and change measured values for residual liquid menu**, path 6, displays the actual measured value. Holding a hand in between them attenuates the signal and the displayed value must decrease considerably.

Mechanical adjustment of the detection module

Stop the conveyor and lock it out to prevent inadvertent switch-on!

1. Place a container between the measuring heads.

2. Conveyor guide rails:
   Adjust the guide rails so that the container between the measuring heads has a lateral tolerance of maximum 5 mm on both sides.



3. Horizontal adjustment:
   Adjust the measuring heads so that they are just slightly behind the conveyor guide rails.

Activate the detection module

In the **detection and reject definition menu** , path 5 for the residual liquid detection, enter the value 1 in order to activate the detection.

Entry of parameters for the residual liquid detection HF

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Change to the **parameters of the residual liquid detection menu** . All following path information is related to this menu.

3. In path 4 enter the length of the measuring window [mm].
The value should be just a little bit lower than the container diameter.

4. Change to path 6 to display the last measured value.

5. Put several empty containers and containers with residual liquid on the conveyor prior to the main trigger.

6. Compare the measured values with the limit value and adapt the limit value in path 5 if necessary.

Function check of the module

1. Change to path 6 for the display of the last measured value.

2. Put several good and faulty containers on the conveyor prior to the main trigger and check whether containers with residual liquid are correctly rejected.

3. Compare the result with the display of the last measured value.

4. Check in the **display counter readings menu** , path 5, whether the counter increased correctly.

5. Switch off the conveyor.

Residual liquid detection Gamma (optional)

General

This measuring bridge is used to measure residual liquids in containers.
A gap value reference rate must be obtained during commissioning to enable a correct evaluation of measurement results. This ensures that measured values greater than 1 are available for processing.

Radioactivity!
Close the radiation area with the shutter switch. DO NOT put your hands in the radiation area unless the green light is on (shutter closed). The orange light (in GB: red) is out in this case.
ONLY persons trained and licensed by HEUFT Company for repair of radioactive devices are authorised to open the measuring bridge.
If desired, especially trained HEUFT service personnel will carry out installation.
Special care is required for the installation and the test of the shutter monitoring circuit (closing of the radiation window)!

For safety reasons every measuring bridge is equipped with a shutter that closes the radiation window. This shutter can be operated manually by the two shutter switches installed at the conveyor. When both switches are in position "1", radiation area open, the shutter will automatically be opened when the device is started and will be automatically closed when the device is switched off. The radiation window remains closed if one of the switches is in position "0".
The shutter status is displayed by an orange/green Gamma warning light (in Great-Britain: red/green).

green warning light:	shutter closed
orange (in GB: red) warning light:	shutter open

If the shutter is closed even though the detection is switched on and containers pass through the measuring bridge, the system emits the fault message "Gamma measuring bridge inactive" (⇒ Messages, page 351).

If the option "automatic shutter control" is activated, the radiation area will be closed for every gap between containers of a programmed length and will only be opened again immediately before the arrival of the next container.

The container dimensions are subject to the following limitations:
The container diameter in the bridge area is limited to 90, 110 or 130 mm due to the passage width of the respective measuring bridge. The container diameters must be at least 10 mm smaller than the passage width of the corresponding measuring bridge as the containers require a lateral guidance tolerance of 5 mm on each side.

Check of the sensor signal from the Gamma measuring bridge

1. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

Radioactivity!
DO NOT put your hands in the radiation area.

2. In the **parameters of the residual liquid detection menu**, path 12, select the display of the actual frequency for the residual liquid detection Gamma.
   The displayed unit is kHz, e.g. 80 = 80 kHz. When attenuating the signal by placing a container below the measuring bridge, the displayed value must decrease considerably.

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Mechanical adjustment of the Gamma measuring bridge

Stop the conveyor and lock it out to prevent inadvertent switch-on!

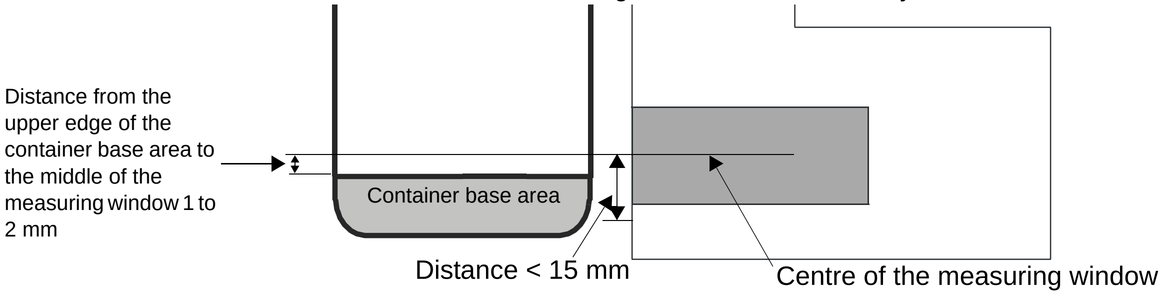
1. Set both shutter switches to position "0", the green light comes on.

2. Place a container below the measuring bridge.

3. Conveyor guide rails:
   Adjust the guide rails in such a way that the container below the measuring bridge has a maximum lateral tolerance of 5 mm on both sides.

4. Vertical adjustment:
   Adjust the measuring bridge so that the middle of the measuring window is approximately 1 to 2 mm above the upper edge of the container base area.

   The distance between the middle of the measuring window and the conveyor must not exceed 15 mm.



Activation of the Gamma residual liquid detection

In the **detection and reject definition menu** , path 5 for the residual liquid detection, enter the value 1 in order to activate the detection.

Entry of parameters for the Gamma residual liquid detection

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Change to the **parameters of the residual liquid detection menu** . All following path information is related to this menu.

3. In path 15 enter the value 1 in order to activate the automatic shutter control circuit.

4. In path 16 enter the gap size (in mm) as of which the shutter will be automatically closed.

This value is a device parameter and valid for all container programs.

5. In path 6 select the display of the last measured value.

6. Set both shutter switches to position "0", the green light comes on.

7. Remove the container from below the measuring bridge.

8. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

Radioactivity!
DO NOT put your hands in the radiation area.

9. Carry out the gap measuring, i.e. interrupt the main trigger with a hand. Repeat the measuring several times.

10. Obtain the average from the measured values displayed in path 6 and add about 10%.

11. Enter this value in path 14 as gap value reference rate for residual liquid.

This value is a device parameter and valid for all container programs.

12. In path 4 enter the length of the measuring window [mm] for the residual liquid detection Gamma. The value should be about 40% to 60% of the container diameter.

13. In path 6 select the display of the last measured value.

14. Compare the measured values of empty containers and containers with residual liquid.

15. In path 5 adapt the limit value if necessary.

Function check of the Gamma measuring bridge

1. In path 6 select the display of the last measured value.

2. Put several good and faulty containers on the conveyor prior the main trigger and check whether the containers with residual liquid are correctly rejected.

3. Compare the results with the display of the last measured value.

4. In the **counter readings menu** , path 5, check whether the counter has been increased correctly.

Shutter closing function

5. Close the shutter with the shutter switches. The warning light must change to green.

6. Send several containers through the detection area.

7. Check in path 17 for shutter faults whether the counter increases correctly.

Automatic shutter control function

8. Turn both shutter switches to position "1", the orange (in GB: red) warning light comes on.

Radioactivity!
DO NOT put your hands in the radiation area.

9. Put several containers in close contact to each other on the conveyor prior the main trigger. Then create a gap in the flow of containers. The length of the gap must at least be equal to the value entered in path 16 of the **parameters of the residual liquid detection menu** .

10. The shutter must automatically close after the corresponding distance and the warning light must change to green.

11. The shutter must automatically open when the next container arrives. The warning light changes to orange (in GB: red).

12. Switch off the conveyor.

Label detection (BA)

General

In case of all-around labels (360°) or foils, one photocell for each label type is sufficient for a reliable detection. For partial labels (181° to 359°) two photocells for each label are required which are mounted at the same level and opposite to each other. The signals of both photocells are linked in a logic circuit so that the system processes only one signal.

In the case of a **label detection at the conveyor**, up to **three** label detection modules with one or two photocells each can be installed to the third detection bridge. An additional foil check is possible as well which is mounted to the first detection bridge together with the closure detection modules.

In the case of a **label detection in the labeller**, up to **four** label detection modules can be installed in the labeller. An additional foil check is possible as well.

Every photocell and pair of photocells can be activated individually depending on the container program.

The processing of the signals supplied by the detection and the subsequent evaluation of containers is carried out as follows:

1. When a label is present the sensor signal must be in the LOW condition.

2. Within the entered measuring window length which is located symmetrically around the container centre the conveyor cycle pulses are counted while the sensor signal is in the LOW condition.

3. The counted value of the conveyor cycle pulses is compared with the entered limit values.

4. If the counted value is between the limits or identical with one of the limit values the container will be classified as "good" in case of a pulse evaluation = "good", otherwise it will be classified as "faulty". In case of a pulse evaluation = "faulty" the procedure is reversed.

Sensor signal check of the label detection

Change to the **mask input signals menu** , path 1, bit 0 (extreme right) displays the foil, bits 3 to 5 the labels 1 to 3 (bit 6 for label 4 in the machine).

1. Does the photocell switch?
   Interrupt the optical path; the signal must change then.

2. Is the switching direction correct?
   Label present = signal LOW (dot disappears from the display).

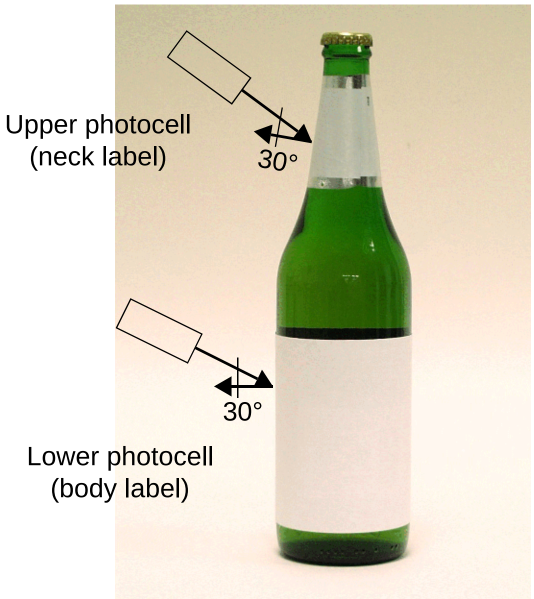
3. Is the signal not LOW?
   Invert the masks for bit 0 or bits 3 to 5.

Label detection at the conveyor

Mechanical adjustment of the sensor for the label detection at the conveyor

Stop the conveyor and lock it out to prevent inadvertent switch-on!

1. Put a container below the measuring bridge.
2. Conveyor guide rails:
   Adjust the guide rails in such a way that the container below the measuring bridge has a maximum lateral tolerance of 5 mm on both sides.
3. Horizontal adjustment:
   Position the measuring bridge so that the sensor is exactly at the side of a container.
4. Vertical adjustment:
   Align the photocells so that the light beam hits the centre of a label at an angle of 30° to the vertical axis. The height and tilt of every photocell must be adjusted accordingly.
   When different container types in the production program are checked for labels, the photocells must be positioned so that the different requirements can be met by adjusting the height of the measuring bridge.



In case of a brand change, the vertical adjustment via the measuring bridge is much easier than the adjustment of individual photocells. If required, sparings must be provided at the guide rails to allow for a correct vertical adjustment.

Activation of the label detection at the conveyor

In the **check definition/reject definition menu** , path 6 to 8 for the label detections 1 to 3 and path 10 for the foil check enter the value 1 in order to activate the detection.

Entry of parameters for the label detection at the conveyor

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.
2. Change to the **parameters of the label detection** menu. All following path information is related to this menu.

   Five paths are available for every label:

path 1 - 5	for label 1,
path 6 - 10	for label 2,
path 11 - 15	for label 3 and
path 21 - 25	for the foil label.

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The same adjustments must be made for all labels in the corresponding paths.
⇒ Menu tree, page 34

3. Enter the length of the measuring window [mm] for labels.
   The value must be lower than the diameter of the container at the height of the detection module.

4. Enter the pulse evaluation.
   1 = good (default value), i.e. the photocell signal is considered as correct label presence.

5. Change to the path for the display of the last measured value.

6. Put several containers with and without labels on the conveyor prior the main trigger.

7. Obtain the measured values and their distribution for the individual container types.

8. Adapt the limit values of lower and upper limit for the number of pulses in the respective paths.

Function check of the label detection

1. Change to the path for the display of the last measured value (path 5 for label 1, path 10 for label 2 etc.).

2. Put several good and faulty containers on the conveyor prior to the main trigger and check whether the containers without labels are rejected.

3. Check in the **display counter readings menu** path 6 through 8 for label 1 through 3 and 10 (foil), whether the corresponding counters have been increased correctly.

4. Switch off the conveyor.

Label detection in the machine

Activation of the label detection in the machine

In the **check definition/reject definition menu** , path 6 to 9 for the label detections 1 to 4 and path 10 for the foil check enter the value 1 in order to activate the detection.

Entry of parameters for the label detection in the machine

1. Change to the **parameters of the label detection** menu. All following path information is related to this menu.

   There is only one path for every label:

Path 2	for label 1,
Path 7	for label 2,
Path 12	for label 3,
Path 17	for label 4 and
Path 22	for the foil label.

2. Enter the pulse evaluation.
   1 = good (default value), i.e. the photocell signal is considered as correct label presence.

Laning (VF)

Variable (optional)

This module is used for the distribution of containers to two lanes in a ratio to be programmed as desired. Faulty containers are not considered in the distribution system but rejected onto a lane determined by the customer.

Entry of distances

Like all other functions of the device, the laning module is also allocated a position on the conveyor. As the results of other detection modules must sometimes also be considered for the laning function, the position where the allocation of a container to a defined lane takes place must be located after the positions of other detection modules. Due to this reason, the laning module is allocated the same position as the one used for the optional bottom photocell.
The bottom photocell is normally mounted to the frame of pedestal at the exit side of the device. The value for this position is preset in the program and must normally not be changed.

Activation of the laning function

In the **detection and reject definitions menu** , path 21 for laning, enter the value 1 in order to activate the laning function.

Entry of laning parameters

1. Change to the **rejector parameter menu** . All following path information is related to this menu.
2. In path 11 enter the number of containers to be distributed to lane 1.
3. In path 12 enter the number of containers to be distributed to lane 2.
4. In path 13 enter the value 1 when containers are **not to be rejected** but are to remain on lane 1. The standard for this value is 0 in order to reject faulty containers to lane 2.

Function check

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.
2. Put several containers on the conveyor prior to the main trigger and let them pass the rejector.
3. Check whether the container distribution is carried out in the correct ratio.
4. Change to the **display counter readings menu** , path 2 and 3, and check whether the counters have increased correctly.
5. Switch off the conveyor.

Jam detector (optional)

The jam detector switch is used to exclude lanes with jammed containers from the distribution. The system emits a message and can generate a switch-off pulse in case of container jams on both lanes.

Sensor signal check of a jam detector

Change to the **masking of input signals menu** .
In path 1, bit 3 (4th from right) displays the signal from the first jam detector,
in path 1, bit 4 (5th from right) displays the signal from the second jam detector.

1. Does the sensor switch?
   Move the bow, the signal must change.

2. Is the switching direction correct?
   The bow is in contact with the proximity switch = signal LOW (the dot disappears from the display).

3. Is the signal not LOW?
   Invert the mask for the corresponding bit.

Function check of the jam detector

For the check the conveyor must be switched on.
Clear the area before the jam detector. Adhere to the safety regulations!

Change to the **masking of input signals menu** .
In path 1, bit 3 (4th from right) displays the signal from the first jam detector,
in path 1, bit 4 (5th from right) displays the signal from the second jam detector.

1. Switch on the conveyor.

2. Let the containers pass the jam detector.
   They must not touch the bow.
   The signal must not change.

When the containers touch the bow even though they are not jammed, adjust the guide rails so that they do not touch the bow.
For the fine adjustment of the bow ⇒ Adjustment of the bow position, page 122

3. Create a container jam at the jam detector.
   The containers must move the bow so far that the signal level will change.

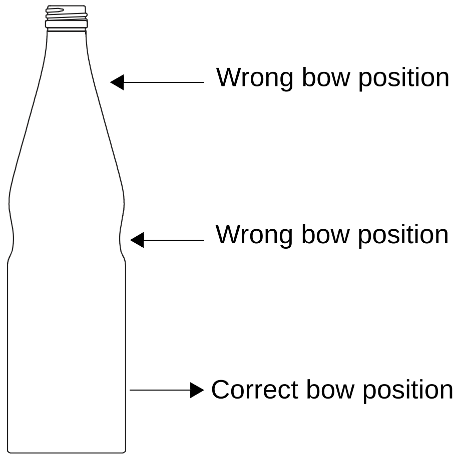
4. There can be two reasons if the signal level does not change because the bow does not moved far enough:

   either:

   The bow does not protrude far enough into the stream of containers: adjust the bow position
   ⇒ Adjustment of the bow position, page 122

   or:

The containers touch the bow with a part of their body area which is smaller than the largest diameter of the container:



Stop the conveyor and lock it out to prevent inadvertent switch-on! Clear the area in front of the jam detector.

Mount the jam detector in another position:

1. Loosen the nuts so far that the jam detector can be moved upwards and downwards.
2. Shift the jam detector so far that the bow is in the body area with the largest diameter.
3. Tighten both nuts.

5. Repeat the function check.
6. The **definition of count signals menu** , path 19 "inhibit distance of jam detector" permits to enter the distance in mm during which the bow must be in the switched condition so that the control unit evaluates this condition as jam.

The default value of "100" implies that the jam detector must be in the switched condition for a distance of at least 100 mm.

In general, the preset value of 100 can be maintained. The longer the entered distance, the less sensitive is the reaction of the detection module to short-term bow movements.

Signal acceptances

Signal acceptance at the conveyor (optional)

Check of the external signal

1. Change to the **masking of input signals menu** , path 2. Bit 3 (4th bit from right) indicates the external signal.

2. Check the switching of the signal
   The display of the signal must change when the external signal condition changes. The dot at the display position must illuminate or extinguish according to the signal condition.

3. Check of the switching direction
   When the external signal level corresponds to the "no signal" condition, the displayed bit must have the internal level HIGH (the dot in the display is on).

4. Change of the internal signal condition
   When the signal condition is not HIGH, select the mask for bit 3 and invert it.

The system processes all detection modules of the device in relation to a position. That means the conveyor cycle is used for an internal container tracking in relation to the conveyor speed and the system always expects the result obtained by the corresponding detection module when a container has actually reached that position.

The acceptance of external signals may cause problems when time delays which are independent from conveyor speed have to be considered for the emission of a signal and the signal is available for a defined time period. The time delays must be kept as short as possible. Therefore, the commissioning always requires the check of detection results at different speeds. The signal acceptance relative to the position can only be carried out after the corresponding container has reached the first trigger in the check area of the device.

Entry of distances

In the **definition of distances menu** , path 25, enter the value for the distance from the main trigger to the position of the signal acceptance. The term "distance inputs" used in the following text is refers to this input.

All distance measures are related to the centre of the corresponding container type.

The distance from the main trigger to the rejector must be at least 400 mm longer than the distance from the main trigger to the external signal.

If the distance from the main trigger to the external signal is 180 mm (400 mm + 180 mm = 580 mm) the distance between main trigger and rejector must be at least 580 mm

(⇒ **definition of distances menu** , path 25 and 27).

Activation of the signal acceptance

In the **detection and reject definitions menu** , path 19 for the external signal, enter the value 1 in order to activate the signal acceptance function.

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Entry of parameters for the signal acceptance

There is no fixed length of the measuring window for this module. Measuring starts with the arrival of a container and ends with the arrival of the next container (but at the latest after 190 mm).

Pulse evaluation

1. Change to the **parameters of the signal acceptance menu** .

All following path information is related to this menu.

2. In path 1 determine the pulse evaluation of the external signal: 0 = bad, 1 = good. The input value is 0 when the external signal source always emits a signal in the case of containers to be rejected. Otherwise, the value 1 must be entered.

Pulse type

The further steps depend on the pulse type of the external signal.

In path 2 determine the pulse type of the external signal:

0 = container-related pulse

1 = container-related signal level (permanent level) which may be available for several containers

The container-related **pulse** is described under the headline **Pulse type = pulse**, the container-related **signal level** is described under the headline **Pulse type = Signal level**.

Pulse type = pulse

Determining the distance

The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

The aim is to find at the minimum speed the largest possible distance between the main trigger and the external signal at which the message 3 17 "external signal too early" will **never** occur.

1. For the distance s_0 (distance main trigger - external signal) in the **definition of distances** menu, path 25 enter at first a value which is 100 mm smaller than the actual distance.
2. Switch on the conveyor at the lowest possible speed v_{min}.
3. Change to the **parameters of the signal acceptance menu** to one of the paths 4 through 7 and press this key in order to clear the counters and displays in the paths 4 through 7.
4. Put a container that generates a signal on the conveyor and let it pass the trigger prior the signal position.
5. Path 4 displays at the right the delay of the signal T_{verz} (in ms). The delay is the time between the arrival of a container at the position and the beginning of the signal.
6. Path 4 at the left counts the number of containers where the signal level was already LOW at the arrival of a container. This condition indicates a too early signal emission.

When the left display (counter "signal too early") is not equal to 0, the signal was already in the LOW condition when the container was detected. The system emits message 3 17 "external signal too early". The signal emission must be delayed. Increase the moment of the signal emission step by step, repeat steps 4 through 6 simultaneously until the right display is 0 and the message 3 17 will not be emitted anymore.

7. Path 6 at the right displays the signal length T_{sig} (in ms).

8. Path 6 at the left counts the number of containers at which the signal continued after a distance of more than 190 mm.

When the left display (counter "signal too long") is not equal to 0, the signal was not completed after a length of 190 mm or after the arrival of the next container (LOW). The system emits message 3 16 "external signal too long".
Define the signal emission for an earlier time or decrease the signal length until the message 3 16 will no longer occur.

9. The largest possible distance s_{max} for the distance between the main trigger and the external signal is the result of the multiplication of the lowest possible conveyor speed v_{min} with the measured delay time T_{verz} (path 4 right); to the obtained value add the distance value entered under point "1.":

   $s_{max}[mm] = v_{min}[m/s] * T_{verz}[ms] + s_0$ [mm]
   From the distance s_{max} calculated in this way subtract 4 mm and enter this value in the **definition of distances** menu, path 25.

10. Repeat the steps 4 through 6 several times. The entry in path 25 is correct when no message is being emitted. In case of the message 3 17 "external signal too early", decrease the entry in steps of 2 mm until the message is no longer emitted.

Determination of the allowable signal length

For this purpose check whether the message 3 16 "external signal too long" is emitted at the maximum speed and in the case of containers with minimum production spacing:

1. Repeat the measurement at the highest conveyor speed v_{max} with 2 containers (with signal, without signal) each (⇒ Determination of distances, 3 to 8).

2. The sum of the delay time T_{verz} and the signal length T_{sig} is called total time T and must not exceed an upper limit. This upper limit can be calculated from the conveyor speed v_{max} and the container distance d (diameter + spacing) under production conditions:

   $$T[ms] = T_{verz}[ms] + T_{sig}[ms] \text{ must be lower than or equal to } T_{max}\,[ms] = \frac{d[mm]}{v_{max}[\frac{m}{s}]}$$

   The measurement will be completed after 190 mm at the latest so that the value 190 mm for d [mm] must be entered into the equation in case of larger distances between containers.

If the total time T is too high, the system emits the message 3 16 "external signal too long" and the left display in path 6 (counter "signal too long") increases.

3. Several measures are possible when the total time T was too high:

   - reduce the signal length
   - reduce the signal delay
   - reduce the maximum conveyor speed
   - increase the minimum conveyor speed

4. Thereafter repeat the setting procedure (begin as from "1. Measurement at the highest possible conveyor speed ..."

Determination of the limits for the signal length

1. Press this key in order to clear the displays in paths 4 through 7. Pressing this key clears all displays simultaneously.

2. Let the installation operate at production speed.

3. Send several containers that generate a signal through the check area of the device. The distance between the containers must not be larger than the distance during production conditions.

4. Check the left display in path 6: it must indicate 0, the signal length is too big if this is not the case. Repeat the measuring, ⇒ Determination of the allowable signal length, page 329.

5. In path 7 right read the measured minimum signal length.

6. In path 3 enter as lower limit a value which is at least lower by 10% than the measured minimum signal length.

Pulse type = signal level

Determining the distance

⚠ The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

The aim is to find at the minimum speed the largest possible distance between the main trigger and the external signal at which the message 317 "external signal too early" will **never** occur.

1. Enter at first the value 0 for the distance s_0 (distance main trigger - external signal) in the **definition of distances menu** , path 25.

2. Switch on the conveyor at the lowest possible speed v_{min}.

3. Change to the **parameters of the signal acceptance menu** and press this key in order to clear the counters and displays in paths 4 through 7.

4. Let 2 containers each (without signal, with signal) pass the detection with minimum spacing.

5. Path 4 displays at the right the delay of the signal T_{verz} (in ms). The delay is the time between the arrival of a container at the position and the beginning of the signal.

6. Increase the distance s_0 until the display in path 4 on the right is 0 (delay T_{verz} = 0).

7. Reduce the distance s_0 by approximately 4 mm.

Determination of the limits for the signal length

1. Operate the installation at maximum production speed.

2. Let 3 containers with minimum production distance (without signal / with signal / without signal) pass the device and read the minimum signal length in path 7 on the right.

3. From the minimum signal length obtained in this way subtract 10 % and enter this value as lower limit in path 3.

Function check of the module

1. Change to path 6 on the right for the display of the last measured value.

2. Put several good containers and containers to be rejected on the conveyor prior to the main trigger and check whether the correct containers are rejected.

3. Compare the results with the display of the last measured value.

The display of the last measuredvalue (right) remains unaltered when no signal is detected (no updating of the display).

4. Check the counter reading for disturbed measurements (left display): it must indicate 0.

5. In the **display counter readings menu** , path 20, check whether the counter has increased correctly.

6. Switch off the conveyor.

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Signal acceptance in the machine (optional)

Check of the external signal

1. Change to the **masking of input signals menu** , path 4. Bit 6 (2nd bit from left) indicates the external signal.

2. Check the switching of the signal
The display of the signal must change when the external signal condition changes. The dot at the display position must illuminate or extinguish according to the signal condition.

3. Check of the switching direction
When the external signal level corresponds to the "no signal" condition, the displayed bit must have the internal level HIGH (the dot in the display is on).

4. Change of the internal signal condition
When the signal condition is not HIGH, select the mask for bit 6 and invert it.

The system processes all detection modules of the device in relation to a position. That means the machine cycle is used for an internal container tracking in relation to the conveyor speed and the system always expects the result obtained by the corresponding detection module when a container has actually reached that position.

The acceptance of external signals may cause problems when time delays which are independent from conveyor speed have to be considered for the emission of a signal and the signal is available for a defined time period. The time delays must be kept as short as possible. Therefore, the commissioning always requires the check of detection results at different speeds. The signal acceptance relative to the position can only be carried out after the corresponding container has reached the first trigger in the check area of the device.

Entry of distances

In the **definition of distances menu** , path 14, enter the value for the distance from the position of the signal acceptance to the machine end. The term "distance inputs" used in the following text is refers to this input.

Activation of the signal acceptance

In the **detection and reject definitions menu** , path 19 for the external signal, enter the value 1 in order to activate the signal acceptance function.

Entry of parameters for the signal acceptance

The measurement comprises the entire machine cycle period between two falling signal edges.

Pulse evaluation

1. Change to the **parameters of the signal acceptance menu** .

All following path information is related to this menu.

2. In path 1 determine the pulse evaluation of the external signal: 0 = bad, 1 = good. The input value is 0 when the external signal source always emits a signal in the case of containers to be rejected. Otherwise, the value 1 must be entered.

Pulse type

In path 2 determine the pulse type of the external signal:

0 = container-related pulse

1 = container-related signal level (permanent level) which may be available for several containers

The container-related **pulse** is described under the headline **Pulse type = pulse**, the container-related **signal level** is described under the headline **Pulse type = signal level**.

Pulse type = pulse

Determination of the relative signal level

The measurement of parameters requires machine operation.
The safety regulations must be observed!

1. For the distance enter the approximate distance (as machine positions) of the signal acceptance to the machine end. The exact position is important for the correct assignment of the signals to the containers but not for the determination of the relative signal levels.

2. Switch on the machine and let it operate at a speed as slow as possible.

3. Change to the **parameters of the signal acceptance menu** and press this key in order to clear the counters and displays in paths 4 through 7.

4. Move the machine with jog operation to the position of the foreign signal emission.

5. Path 4 displays on the right the signal delay T_{verz} (in ms). This is the time between the falling edge of the machine cycle and the beginning of the signal.

6. Path 4 at the left counts the number of containers where the signal level was already LOW at the arrival of a container. This condition indicates a too early signal emission.

When the left display (counter "signal too early") is unequal to 0, the signal was already in the LOW condition when the container was detected. The system emits message 3 17 "external signal too early". The signal emission must be delayed (right display = 0) or the position of foreign detection module must be changed.

If the delay time is too high, move the position of the foreign detection module so that the delay time is reduced.

The counter "signal too early" (path 4 left) must never count upwards when the containers pass the detection module in jog operation.

7. Path 6 (right) displays the signal length T_{sig} (in ms).

8. Path 6 left counts the number of containers at which the signal was too long.

When the left display (counter "signal too long") is unequal to 0, the signal was not completed after the falling edge of the machine cycle (LOW). The system emits the message 3 16 "external signal too long". Either the signal length must be reduced or the machine cycle of the device must switch later.

Determination of the allowable signal length

1. Repeat the measurement at the highest machine speed (⇒ Determination of distances, 3 through 5).

2. The signal length of the external detection module must fulfil the following condition. The upper limit of the total time T obtained as sum of the delay time T_{verz} and the signal length T_{sig} must be lower than the duration of the period T of the machine cycle:

   $T[ms] = T_{verz}[ms] + T_{sig}[ms]$ < duration of the period T of the machine cycle

If the total time T is too high, the system emits a message (3 16) and the left display in path 6 increases. The signal length must be reduced so far until the requirement is fulfilled and the message is no longer emitted. The minimum signal length is 4 ms.

Determination of the limits for the signal length

1. Press this key in order to clear the displays in paths 4 through 7. Pressing this key clears all displays simultaneously.

2. Let the installation operate at production speed.

3. Send several containers that generate a signal through the machine.

4. Check the left display in path 6: it must indicate 0, the signal length is too big if this is not the case. Repeat the measurement, ⇒ Determination of the allowable signal length.

5. In path 7 right read the measured minimum signal length.

6. In path 3 enter as lower limit a value which is at least lower by 10% than the measured minimum signal length.

Pulse type = signal level

Select the delay time of the foreign device as short as possible.

Determination of the relative signal level

The measurement of parameters requires machine operation.
The safety regulations must be observed!

1. Use the jog operation to pass containers or series of containers through the machine so that one signal is emitted each time for the duration of **one** container position.

2. Position the foreign detection module in such a way that the signal arrives at the machine with the falling edge of the machine cycle but that the delay time (path 4 right) is still higher than 0.

Determination of the limits for the signal length

1. Set the machine to the maximum speed and generate signals each time for one container.

2. In path 7 right read the measured minimum signal length.

3. In path 3 enter as lower limit a value which is by 10% lower than the measured minimum signal length.

Determination of the position of the module

1. Send a container that generates a signal through the machine in between several other containers.

2. Check whether the correct container was rejected. When a wrong container was rejected the distance ("distance" menu) must be adapted accordingly. Repeat the measurement.

Function check of the module

1. Change to path 6 (on the right) for the display of the last measured value.

2. Send several good containers and containers to be rejected through the machine and check whether the correct containers are rejected.

3. Compare the results with the display of the last measured value.

The display of the last measuredvalue (right) remains unaltered when no signal is detected (no updating of the display).

4. Check the counter reading for too long measurements (left display): it must indicate 0.

5. In the **display counter readings menu** , path 19, check whether the counter has increased correctly.

6. Switch off the machine.

Peripheral equipment

Serial fault standard

General

Every rejected container, i.e. every detected fault increases a device counter by 16 points, every good container reduces this counter by one point. The system emits a message and generates a stop pulse when the internal counter value becomes higher than the programmable limit value multiplied by 16. The message must be confirmed, so that the system is able to emit it anew. The generation of the switch-off pulse can be deactivated.

The first good container after the confirmation of the message clears the internal counter. When, after the emission of the message, only bad containers are detected, the message is not emitted again.

Sampled good containers are in this case not considered as rejected containers.

Activate the detection module

Change to the **determining count signals menu** .
The entry of the values 1 to 15 in path 1 determines the number of successive faulty containers only just accepted. The next faulty container exceeding this limit initiates the emission of the message 4 0 13 "production with too many faults" and generates a stop pulse.
When 0 is entered in path 1, the serial fault function is switched off. The message and the stop pulse will not be generated.

Function check

1. Enter a low value (e.g. 2).

2. Check at least one more faulty container than the entered value (3 in this example).
   A maximum of 16 good containers is allowed in between these containers. In order to generate the fault signal, one more faulty container is required for every 16 good containers.

3. After the passage of the corresponding number of containers, the system must emit the message 4 0 13.

Switch-off pulse

General

In order to ensure the product quality, a signal for a conveyor stop can be generated in case of problems in the check area. The reasons for the signal emission can be an increased number of faults, indicated by the serial fault module or the reaction of the reject verification trigger.

If the stop pulse is not released, the system only emits a message. Otherwise, the stop pulse will be generated in addition to the message. The signal length of the stop pulse is 300 ms, the customer can use this potential-free signal as required for his purposes.

Activate the detection module

In the **determining count signals menu** , path 4, enter the value 1 to activate the switch-off pulse. When the switch-off pulse is deactivated by entering 0, the system emits the fault message 3 0 01 "stop pulse 1 inactive".

Function check

If the device includes a fault detection module, the function can be checked as follows:

1. Enter a low value (e.g. 2).
2. Check at least one more faulty container than the entered value (3 in this example).
   A maximum of 16 good containers is allowed in between these containers. In order to generate the fault signal one more faulty container is required for every 16 good containers.
3. Change to the **mask output signals menu** , path 3.

   Bit 1 (2nd from right) indicates the switch-off pulse for the conveyor.

   Simultaneously with the emission of the message 4 0 13 , the system sets the signal level to LOW.

If the device includes a variable laning module, the function can be checked as follows:

1. Switch both jam detector switches.
2. Change to the **mask output signals menu** , path 3.

   Bit 1 (2nd from right) indicates the switch-off pulse for the conveyor.

   Simultaneously with the emission of the message 4 0 22 , the system sets the signal level to LOW.

Count signals

General

Inputs

A maximum of four different count signals can be counted via the parallel interface of the device and be displayed on the front panel. In the inactive condition, the signals are at HIGH level. When the external signal source switches the input to the LOW level, the respective counter will increase. The scanning is carried out in cycles of 20 milliseconds so that the levels must at least be available for a duration of 20 ms. If the clear counters signal is activated as input, a signal at the respective input will clear all internal counters of the device.

Outputs

Up to four unit counters of the device can be transmitted to an external device via another parallel interface. The selection is carried out via a menu. The transmission of the signals can be according to two different procedures. Either edge triggering or pulse triggering can be selected (⇒ Outputs, page 83. A reduction factor is available for both procedures. In case of edge triggering, this factor determines after how many trigger pulses the signal condition will change. In case of pulse triggering, it determines after how many pulses a signal will be transmitted.

The pulse length ranges from 1 - 255 ms. If the pulse - break ratio is higher than 1:1, i.e. the break is shorter than the pulse duration, the system emits the message , *3 0 12* "count signals disturbed". This message can be confirmed. The signal length must then be reduced or the reduction factor must be increased.

The entered parameters are each time valid for all active counter outputs.

If the clear counters signal is activated as output, a signal of 300 ms is emitted when the device counters are cleared via the front panel. This signal can be used to clear all external counters.

Activate the detection module

Change to the **determining count signals menu** . All following path information is related to this menu.

1. Inputs:
   In path 13, clear counters, activate the input signal function by entering 1.

2. Outputs:

   In path 6, pulse type of count signals, set the type of triggering:
   - 0 = edge triggering,
   - 1 = pulse triggering.

3. In path 7, pulse length of count signals, enter the desired value between 1 and 255 ms.

4. In path 8 enter the reduction factor for the count signals within the limits of 1 to 255.

5. In paths 9 trough 12 determine the counters for the outputs 1 to 4:

   0 = inactive (default value),

   1 through 18 = enter the number of the unit counters selected for the emission. The allocation of the individual counters is listed in the menu tree.

6. In path 14, clear counters, activate the function of the output signal by entering 1.

Function check

Inputs

1. Change to the display counter readings menu and select the paths 21 to 24 for the external counters 1 to 4.

2. Generate external signals.

   The respective displays must correctly increase.

3. Change to the **determining count signals menu** .

4. In path 13 activate the input signal "clear counters".

5. Change to the **display counter readings menu** .

6. Generate the external clear signal.

   All counter readings (paths 1 through 24) must be cleared.

Outputs

7. In the **determining count signals menu** , path 14 activate the output signal clear counters.
8. In the paths 9 to 12, counter output 1 to 4, enter the value 1 for the total counter.

9. Clear the counters via the front panel

   When the wiring is correct, the activation of the output signal clear counters clears all counters of the external device (slave). If this is not the case clear these counters manually and check the wiring.

10. In the **display counter readings menu** , path 1, select the total counter.

11. Check any container types so that counter 1 increases. The output signals must be emitted at the same time.

12. Compare the front panel display with the display of the external device.
    Both values must be coincident.

Adjustment of additional triggers

General

A maximum of two additional triggers can be used beside the main trigger.

One additional trigger is mounted shortly prior the rejector and is used for the repositioning of containers prior the rejector, when the distance to the main trigger and the detection modules is more than 2000 mm. The containers must not skid on the conveyor so that they do not pass the photocell of the additional trigger too early o by not more than one half container diameter too late.

One trigger for the reject verification is mounted after the rejector in the flow of good containers and monitors the correct rejector function. The system expects a gap in the flow of good containers for every rejected faulty container. If there is a trigger signal, the system emits a fault message and generates a switch-off pulse in order to avoid that faulty containers remain in the flow of production containers. The message of the reject verification must be confirmed so that it can be emitted anew. The generation of the switch-off pulse can be deactivated.

If there is only **one** additional trigger in the device, it is always designated as 2nd trigger regardless of whether it is used as additional trigger or as reject verification trigger.
Exception: an additional trigger is installed between machine and standard device. In this case this additional trigger is used as 1st trigger and the trigger at the standard device is used as 2nd trigger.

Checking the trigger function

Change to the **mask input signals menu** , path 3, bit 1 (2nd from right) indicates the 2nd trigger, bit 2 (3rd from right) indicates the 3rd trigger.

Bit 0 (right) indicates the 1st trigger (main trigger).

1. Does the photocell switch?
   Interrupt the optical path; the signal must change then.

2. Is the switching direction correct?
   Photocell covered = signal LOW (the dot disappears from the display).

3. Is the signal not LOW?
   Invert the mask for bit 1 or bit 2.

Vertical adjustment of a trigger photocell

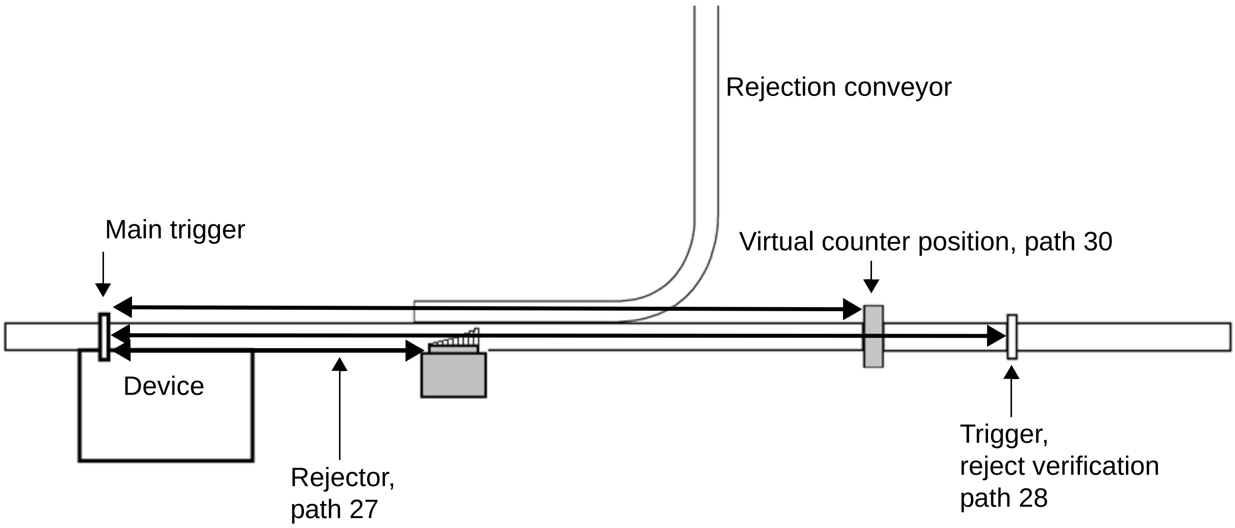
Bottles:	adjust to the height of the closure centre.
Cans:	adjust to approximately 3 mm below the upper edge, i.e. put a can in the centre below the measuring bridge in the upper position. Reduce the height until the photocell reacts, then reduce the height by another 3 mm.

Check whether the display of the LEDs at the trigger photocell is correct,
the green LED is steady, the red LED is on when the light beam is not interrupted and goes out in case of an interruption.

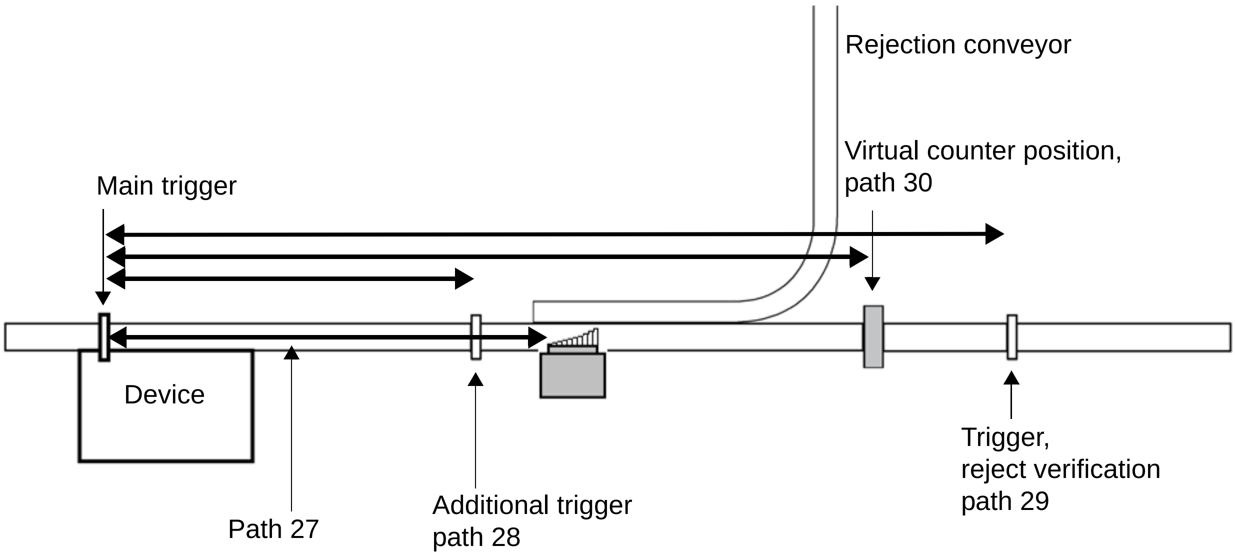
Entry of distances

In the **determining distances menu** , paths 28 and 29 for the 2nd and 3rd trigger, measure the distance between the main trigger and the photocell of the respective additional trigger and enter this value.

When used as additional trigger, the photocell must be mounted at least 200 mm prior the rejector.
When used as reject verification trigger, the photocell must be mounted after the rejector, the counting position (path 30) must be located between the rejector and the reject verification trigger.



Device with main trigger and reject verification as 2nd trigger



Device with main trigger, additional trigger as 2nd trigger and reject verification as 3rd trigger

Function check

The settings are checked as follows:

⚠ The measurement of parameters requires conveyor operation. Adhere to the safety regulations!

1. Switch on the conveyor.

2. Additional trigger:
   Put three containers in the order good/faulty/good in close contact to each other on the conveyor prior the main trigger and let them pass.

3. The faulty container must be reliably rejected.

Function check for the additional trigger

In case of malfunctions correct the setting as follows:

» Faulty container hits the extended rejector segment:
  increase the entered value.

» Faulty container is still touched by the extending segment after its passage:
  reduce the entered value.

4. Correct the distance entry if necessary.

5. Reject verification trigger:
   Put three containers in the order good/faulty/good in close contact to each other on the conveyor prior the main trigger and let them pass.

6. The system must not emit a message.

Function check for the reject verification trigger

In case of malfunctions correct the setting as follows:

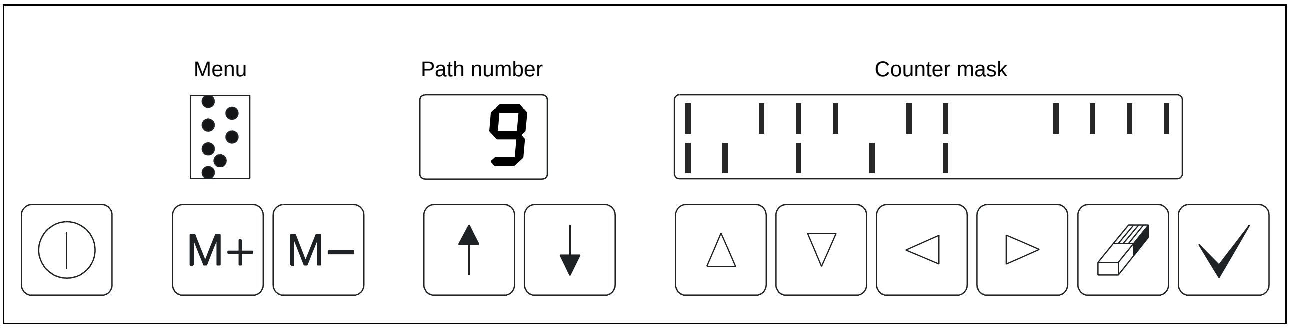
Confirm the message and correct the distance input:

» If the message 4 0 11 is emitted in case of the first container:
  increase the entered value.

» If the message 4 0 11 is emitted in case of the third container:
  reduce the entered value.

Production

The production process must be monitored after the commissioning of the device is completed. The **rejector menu** , path 9 displays the faults of the last rejected container. One vertical segment is reserved in the digital display for every counter. Every detected fault is displayed at the corresponding position. The upper row displays the counters 1 through 16, the lower one the counters 17 through 24. The last 8 bits of the lower row are not used.



The display remains until the rejection of the next container. By monitoring the production process, it can be determined whether individual detection modules detect too many or too few container faults and whether the entire installation functions reliably throughout all production conditions. When problems are detected, the data entered for the respective item must be rechecked.

Printing out parameters

In the Appendix of the Operator's Manual the device and detection parameters can be entered manually after commissioning. At the same time, the entered parameters may be printed out on paper via the parallel interface of a printer (⇒ Print-out of parameters, page 48).

Trouble shooting

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Trouble shooting procedures

General

This chapter describes the trouble shooting for the device and is intended for use by personnel with the corresponding technical training. These are generally the electricians or mechanics of the technical department. In addition, the HEUFT training department offers training courses at regular intervals which also deal with trouble shooting.

Danger of electric shock!
The mains power supply cable still has live voltage after switching off at the main power switch!

Prior to starting work at the device, stop the conveyor and lock it out to prevent inadvertent switch-on!

The trouble shooting procedure is basically distinguished by the fact whether the system itself has detected a malfunction or not. This condition is displayed by the automatic change of the front panel display to the device status/messages menu or by a yellow or red warning light.

In the first case, read the function group number, the message number and the reference number in the device status/messages menu (⇒ Display of the device status, page 354). With the help of this information, the list of messages provides hints relating to the cause of the malfunction and the corrective actions.

⇒ Messages, page 353

When a fault is not displayed by a message, the cause of the malfunction must be found step by step. These trouble shooting procedures are divided into faults during switch-on and faults during operation. This chapter includes a list of flow diagrams for this kind of trouble shooting.

The white boxes contain the questions to locate a fault and the grey-shaded boxes contain the instructions to be followed.

⇒ Malfunctions, page 367

Call HEUFT service

The HEUFT service department must be called if a fault cannot be eliminated by using the available means. The phone number and e-mail address are listed on page 3.

Please state the following information for a service request:

» nine-digit device number

» device status and message

» exact fault description

» measures already taken

» missing spare parts, etc.

Messages

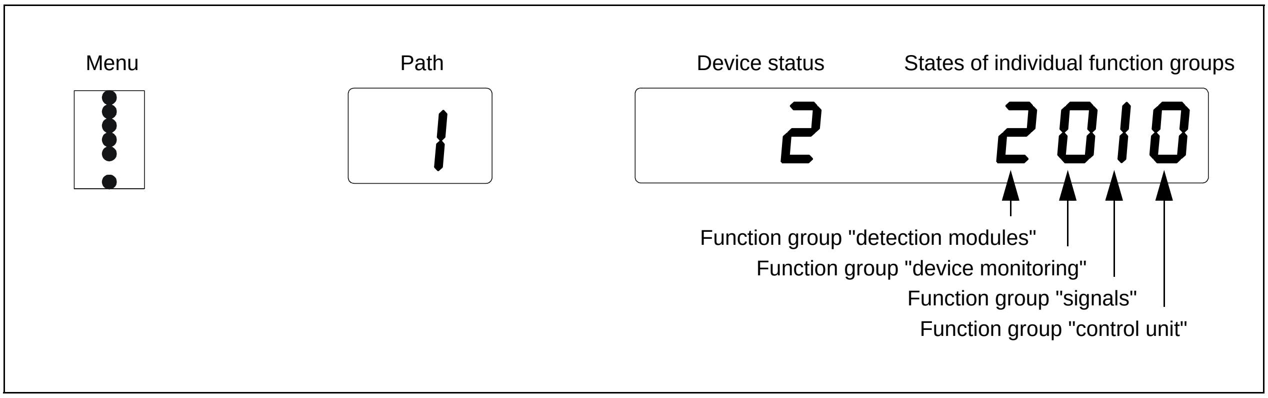
General

Display of the device status

The readiness for operation of the device is displayed as device status. The device status is the result obtained from the states of the individual function groups and corresponds always to the highest status. If the warning light is part of the device, it also indicates the device status (⇒ Signals, warning light (optional), page 219).

» Change to the device status/messages menu.

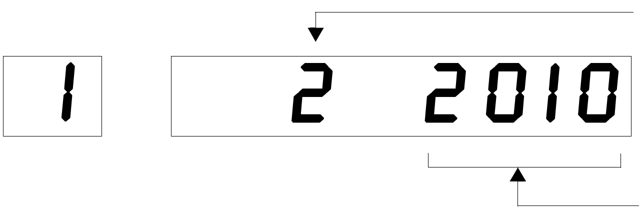
On the front panel the device displays the device status (Path 1):



As long as the device operates without external or internal faults the device status "0" is valid and the optional warning light is "green". If individual detection modules signal a malfunction which does not endanger the production process, the status "1" is valid and the warning light is "yellow". If the device is disturbed in a way that the monitoring of the production is no longer possible, the status switches to "2" and the optional warning light is "red".

Device status		Warning light (optional)
0	Normal production	green
1	Limited device function	yellow
2	Device function disturbed	red

In the path 1 not only the device status is displayed but also the states of the four function groups control unit, signals, device monitoring and detections.



Device status 2: device function disturbed, red warning light

States of individual function groups:

Example:
Function group detections = red (2),
Function group device monitoring = green (0)
Function group signals = yellow (1)
Function group control unit = green (0)

The function group detections has the highest status (2). The device status corresponds to the highest status.

If the device status is increased (from 0 to 1, from 1 to 2, or from 0 to 2), the menu device status / messages appears automatically on the front panel, provided that the device is at the operator level.

Display of messages

If particular internal or external faults are detected by the device, it emits a fault message.

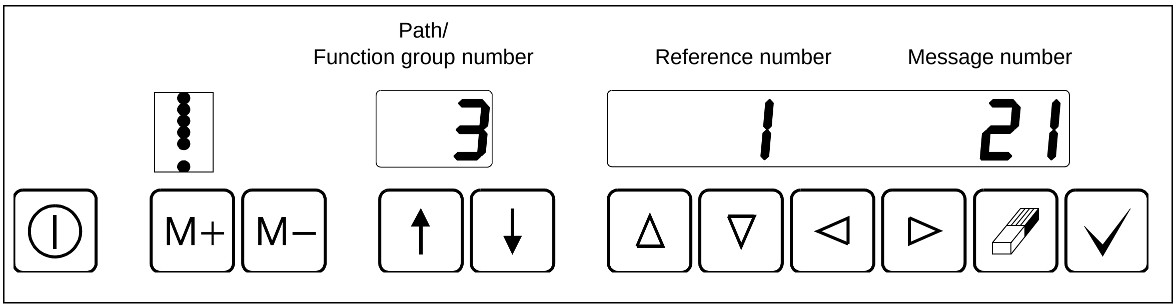
» Press one of the keys ↑ ↓. The system automatically displays the message of the first function group with an available message.

By pressing the keys again, all function groups with a current message can be selected one after the other. The paths 2 to 5 each correspond to a function group.

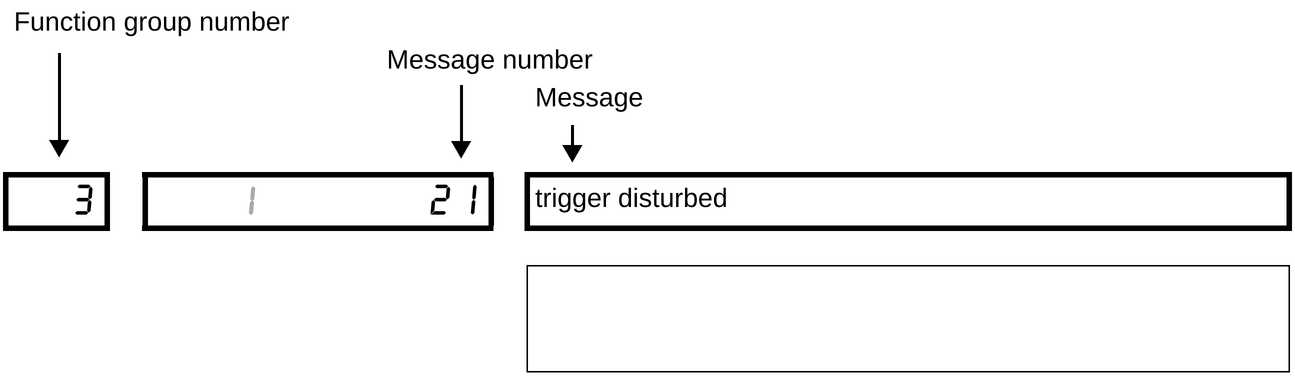
Path	**Function group**
2	Control unit
3	Signals
4	Device monitoring
5	Detection modules

In case of several simultaneous messages of one function group, the system automatically switches between the messages. Every message is displayed for one second.

Fault message on the front panel:



The message in the example belongs to the function group " 3" "signals". The message number is "21". By means of these two numbers you will find the message in the tables (⇒ page 357). The tables of the messages are sorted in the order of the function groups.



Additional information is available via the reference number. In this example the reference number is "1". This means that the main trigger is disturbed as it can be seen in the table of the messages (⇒ page 357).

Reference number

↓

3 1 2 1	trigger disturbed The reference number is a coded indication of the trigger number. 1 = Main trigger, 2 = 2nd trigger, 4 = 3rd trigger, 3,5,6,7 = Sum from the respective triggers = several disturbed triggers
Cause:	The trigger is not released after 1 m of conveyor movement.
Corrective action:	Clean the trigger, call a specialist when message occurs repeatedly.
Specialist:	Check the function of the trigger photocell, the wiring and the switching direction of the trigger signal.

If a "0" is indicated at the position of the reference number, no reference number is available for this message.

The first digit of the message number indicates the warning light status of a message:

0 = Normal production
1 = Limited device function
2 = Device function disturbed

Messages which can be confirmed are marked with an asterisk "*****". When you press the key all the messages of the selected function group which are subject to confirmation are deleted.

All numbers within a message which may change are displayed in grey. These comprise the reference numbers and the states of the individual function groups of the device status.

The instruction "Call a specialist" as corrective action implies the following:

A: Advise personnel with the appropriate technical training and the Reference Handbook

or

B: Request assistance by the HEUFT service

All fault messages generated by the device are listed on the following pages. The function group number provides the information which one(s) of the device(s) is concerned by a message:

BA: Full container checks
VF: Laning/fluid

1 Device status

1	0 0000	Normal production operation, green warning light status.
BA	Cause:	
VF	Corrective action:	
	Specialist:	

1	1 0100	Limited device function, yellow warning light status.
BA	Cause:	Individual detection modules signal a disturbance limiting the device function; the production operation is not endangered.
VF	Corrective action:	Find the cause of the status change in the "messages" menu and eliminate it according to the message.
	Specialist:	

1	2 2100	Device function disturbed, red warning light status.
BA	Cause:	Individual detection modules signal a disturbance causing the incorrect function of the device; monitoring of the production is impossible.
VF	Corrective action:	Find the cause of the status change in the "messages" menu and eliminate it according to the message.
	Specialist:	

2 Control unit

2	0 01	Power failure
BA	Cause:	The device was switched off with the main power switch or there was a power failure.
VF	Corrective action:	For shutdown switch the device first to the stand-by mode and only after that switch it off with the main power switch.
	Specialist:	Check data: It is possible that the last entered data, less than 30s before the power failure, were not saved.

2	0 11	Battery fault
BA	Cause:	Uncontrolled change of data in the RAM memory.
VF	Corrective action:	Call a specialist.
	Specialist:	Replace the battery in conjunction with the standard device message no. 13. Replace the *basic* CPU card when the message occurs repeatedly.

2	0 12	EEPROM sum fault
BA	Cause:	Uncontrolled change of data in the EEPROM memory.
VF	Corrective action:	Call a specialist.
	Specialist:	Replace the EEPROM.

2	0 13	Battery exhausted
BA	Cause:	Battery voltage below 2.6 V.
VF	Corrective action:	Call a specialist.
	Specialist:	Replace the battery. It may be possible that battery data have been lost (see message no. 11).

2	0 14	Program overload *
BA	Cause:	Conveyor speed is higher than 1.5 m/s.
VF	Corrective action:	Reduce the conveyor speed. Confirm the message via the front panel.
	Specialist:	Check the conveyor control so that speeds exceeding 1.5 m/s are not possible.

2	0 23	Data backup impossible
BA	Cause:	Automatic saving on EEPROM was unsuccessful.
VF	Corrective action:	Call a specialist.
	Specialist:	Replace the EEPROM, re-enter all data, repeat saving. Replace the *basic* CPU card if the action is unsuccessful.

3 Signals

3	0 01	Switch-off pulse 1 inactive
BA	Cause:	The emission of the switch-off pulse in case of serial faults is deactivated.
VF	Corrective action:	Call a specialist.
	Specialist:	Activate the switch-off pulse in the "Determine count signals" menu.

3	0 02	Switch-off pulse 2 inactive
BA	Cause:	The emission of the switch-off pulse in the case of serial faults in the machine cycle area is switched off.
	Corrective action:	Call a specialist.
	Specialist:	Activate the switch-off pulse in the "Determine count signals" menu.

3	0 12	Count signals faulty *
BA	Cause:	The set signal length is longer than the break period between two count signals.
VF	Corrective action:	Confirm the message. call a specialist.
	Specialist:	Reduce the signal length or enter a new predivisor value for count signal emission in the "Determine count signals" menu.

3	0 14	Filler synchronisation faulty
BA	Cause:	The synchronization signal from the filler has switched too early or too late or is missing.
	Corrective action:	Call a specialist.
	Specialist:	Check the sensors for synchronization and container presence and check the signal condition (see commissioning machine recognition, valve locator).

3	0 15	Program number inadmissible
BA	Cause:	During an external program switch an inadmissible program has been selected. The last program remains active.
VF	Corrective action:	Call a specialist.
	Specialist:	Activate the desired program in the menu "Determining container programs".

3	0 16	External signal too long *
BA	Cause:	The signal length or the signal delay is too long.
VF	Corrective action:	Confirm the message. call a specialist.
	Specialist:	Check the signal parameters and enlarge the distance (in the "Definition of distances" menu), if necessary.

3	0 17	External signal too early *
BA	Cause:	The signal delay is too small.
VF	Corrective action:	Confirm the message. call a specialist.
	Specialist:	Check signal parameters and reduce distance (in the "Definition of distances" menu), if necessary.

3	2 21	Trigger disturbed The reference number is a coded indication of the trigger number. 1 = Main trigger, 2 = 2nd trigger, 4 = 3rd trigger, 3,5,6,7 = Sum from the respective triggers = several disturbed triggers
BA	Cause:	The trigger is not released after 1 m of conveyor movement.
VF	Corrective action:	Clean the trigger, call a specialist when message occurs repeatedly.
	Specialist:	Check the function of the trigger photocell, the wiring and the switching direction of the trigger signal.

3	0 22	Encoder defective
	Cause:	No pulses counted at the cycle input despite of available trigger signals.
	Corrective action:	Call a specialist: check the encoder wiring and the connection to the conveyor. Replace the encoder if necessary.
	Specialist:	Check that the plug and the coupling are fixed securely. Check the conveyor cycle signal.

3	0 27	Presence signal disturbed
BA	Cause:	A container was detected at the Bottle Burst sensor, but not at the container presence sensor.
	Corrective action:	Call a specialist.
	Specialist:	Check the presence sensor and the distance input for presence - Bottle Burst in the "Distances" menu.

4 Device monitoring

4	0 11	Reject verification has detected a rejection fault *
BA VF	Cause:	a) A faulty container was not rejected. b) A container slipped into a gap caused by a rejection prior to the reject verification. c) An additional container was placed on the conveyor.
	Corrective action:	to a) Check the air pressure at the rejector. to b) Check the guide rails. to c) Do not put additional containers on the conveyor in the check area Confirm the message.
	Specialist:	a) Check the rejector. b) Check the distance input in the "Distances" menu.

4	0 12	Too many faulty labels *
BA	Cause:	Number of serial faults exceeded by labeller faults.
	Corrective action:	Locate the label fault in the labeller and eliminate it. Confirm the message.
	Specialist:	The message appears when the entered number of serial faults is exceeded (0-16). Check the input in the "Determine count signals" menu, path 2.

4	0 13	Too many production faults *
BA	Cause:	Number of serial faults exceeded by too many rejections.
VF	Corrective action:	Locate the production fault and eliminate it. Confirm the message.
	Specialist:	The message appears when the entered number of serial faults is exceeded (0-16). Check the input in the "Determine count signals" menu, path 1.

4	38 14	Filler valve defective * The reference number indicates the filler valve number (0-200).
BA	Cause:	The respective valve has exceeded the number of serial faults for incorrect fillings.
	Corrective action:	Locate the production fault and eliminate it. Confirm the message.
	Specialist:	The message appears when the entered number of serial faults is exceeded (0-16). Check the input in the "Determine count signals" menu, path 3.

4	0 21	Work/rest switch pressed
BA	Cause:	Rejector inactive because of pressed work/rest switch.
VF	Corrective action:	Turn the work/rest switch in direction of the arrows.Call a specialist when the switch is released, but the message is not reset.
	Specialist:	Check the function, the switching direction of the signal and the wiring.

4	0 22		Jam on every lane
	Cause:		Both lines are jammed. A switch-off pulse is generated.
VF	Corrective action:		Eliminate the jam.
	Specialist:		

5 Detection modules

5	0 11	False gap value for HF
BA	Cause:	a) During production: Within 30 min. there was no sufficient gap between containers to carry out an internal reference measuring of the measuring bridge. b) After start-up/switch-over to normal mode: There was no reference measuring within 2 m of conveyor movement resulting in an incorrect function of the measuring bridge.
	Corrective action:	Create a gap between containers in the production stream. Call a specialist when the message is not reset.
	Specialist:	Check the HF-gap value in the "Fill level detection" menu, path 9; when the value is 0 check the wiring and replace the bridge, if necessary.

5	1 11	X-ray gap value is missing The reference number indicates the X-ray measuring bridge (1: UF, 2: OF, 3: both).
BA	Cause:	a) During production: Within the defined period of time for the gap value monitoring there was no sufficient gap between the containers to carry out a gap value measurement. b) After start-up no automatic measurement of gap values has been carried out. c) The obtained gap value was too small.
	Corrective action:	Create a gap between containers in the production stream or deactivate the gap value monitoring or deactivate the automatic gap value measurement. Call a specialist when the message is not reset.
	Specialist:	Check the X-ray gap value in the 'Parameters of the fill level detection' menu, line 17/18.

5	0 12	Container transfer to *sonic* too late *
BA	Cause:	The distance input in the menu "determining of distances", line 22, is too large.
	Corrective action:	Check the distance between trigger and closure sensor. The distance input in the menu "determining of distances", line 22, must be at least 10 mm smaller than the delay distance in the menu "Parameters of the closure detection, *sonic*", path 1. Confirm the message.
	Specialist:	Check distances and wiring.

5	0 22	Residual liquid detection HF disturbed
	Cause:	The system always reads out the same value.
VF	Corrective action:	Check the cable connections. Call a specialist, if necessary.
	Specialist:	In 10 successive measurings all measured values are equal. Check the distance conveyor main trigger - residual liquid detection, replace defective parts, if necessary.

5	0 22	HF measuring bridge disturbed
BA	Cause:	The measured frequency value of the measuring bridge is below the entered warning threshold.
	Corrective action:	Clean the HF-measuring bridge. Call a specialist when the message is not reset.
	Specialist:	Check the wiring, replace the bridge, if necessary.

5	0 23	Closure detection disturbed
BA	Cause:	The A/D-converter always reads out the same value.
	Corrective action:	Check the distance trigger - closure sensor, the vertical adjustment, the horizontal adjustment and the cable connections.
	Specialist:	Replace the sensor and other defective parts, if necessary.

5	4 23	Closure detection disturbed
BA	Cause:	For 10 successive containers no end of measuring has been detected.
	Corrective action:	Check the cable connections.
	Specialist:	Replace the card T188-SON if necessary.

5	5 24	Label detection disturbed The reference number indicates the label number (1-5).
BA	Cause:	The sensor is not released after 2 m of conveyor movement.
	Corrective action:	Check the adjustment of the measuring bridge according to the container type (see table of the Condensed Manual).
	Specialist:	Check the sensor alignment with regard to the labels, check the switching of sensors, replace if necessary.

5	2 25	Measuring bridge residual liquid detection Gamma inactive
	Cause:	The shutter is closed.
VF	Corrective action:	Open the shutter by activating the Gamma switch. Call a specialist if this does not reset the message.
	Specialist:	Check the wiring, replace the bridge, if necessary.

5	3 25	Gamma measuring bridge inactive / X-ray measuring bridge inactive The reference number indicates the measuring bridge (1: UF, 2: OF, 3: both).
BA	Cause:	The shutter is closed.
	Corrective action:	Open the shutter by activating the Gamma switch or the shutter switch in case of an X-ray unit. Call a specialist if this does not reset the message.
	Specialist:	Check the wiring, replace the bridge, if necessary.

5	0 26	Bottle Burst disturbed
BA	Cause:	Detection of 10 successive containers as burst.
	Corrective action:	Check whether the containers are in fact burst. Call a specialist if this is not the case.
	Specialist:	Check the presence sensor and the distance presence sensor - Bottle Burst in the "Distances" menu.

5	2 27	Gamma measuring bridge defective / X-ray measuring bridge defective The reference number indicates the measuring bridge (1: UF, 2: OF, 3: both).
BA	Cause:	The receiver in the measuring bridge does not receive pulses, even though the shutter is open.
	Corrective action:	Call a specialist.
	Specialist:	Check the wiring, replace the measuring bridge, if necessary.

5	2 27	Measuring bridge of residual liquid detection Gamma defective
	Cause:	The receiver in the measuring bridge does not receive pulses, even though the shutter is open.
VF	Corrective action:	Call a specialist.
	Specialist:	Check the wiring, replace the measuring bridge, if necessary.

5	0 28	Fill level measuring disturbed
BA	Cause:	The end of the measuring was not detected.
	Corrective action:	Call a specialist.
	Specialist:	Replace the *basic* CPU card

6 Operating hours counter

6	1765	In the operating mode the counter is increased every hour.
BA	Cause:	
VF	Corrective action:	
	Specialist:	

RB *basic* V8.00

Malfunctions

RB *basic* V8.00

Faults when switching on

The following malfunctions may occur during device switch-on or start-up from the stand-by mode:

⇒ The front panel remains dark, page 367

⇒ Front panel display is not correct, page 367

⇒ Front panel displays "DEFAULT" at every start-up, page 368

The front panel remains dark

Failure of the mains supply?

yes → Check the mains connection

No ↓

Are the circuit breakers still OK?
⇒ Circuit breakers F1 and F2 in the terminal box, page 2 of the wiring diagrams

No → Replace the defective circuit breakers (HPE900009 ST, 2A semi time-lag, 5x20 mm)

Yes ↓

Is the internal power supply defective?

yes → ⇒ Checking the power supply units, page 380

No ↓

Check the connection cable BAS no. 1 between *basic* terminal card and *basic* CPU card

Front panel display is not correct

No program start

↓

Are EPROM and RAM present and correctly inserted?

No → ⇒ EPROM insertion, page 180

Yes ↓

Is the 5 V power supply correct?

No → ⇒ Checking the power supply units, page 380

Yes ↓

Replace the *basic* CPU card
⇒ basic CPU card T188-BC HBE010190 ST2, page 392

Front panel displays "DEFAULT" at every start-up

Is the EPROM correctly inserted?

No → **⇒ EPROM insertion, page 180**

Yes ↓

Is the EPROM defective?

yes → **Replace the EPROM**

No ↓

Replace the *basic* CPU card
⇒ basic CPU card T188-BC HBE010190 ST2, page 392

Faults during operation

The following malfunctions may occur during operation:

If none of the above mentioned symptoms occurs, the operator can check the function of the following parts:

Containers are not counted

Switch on the conveyor

Is a speed value displayed?
- No: ⇒ Checking the encoder, page 379
- Yes: continue

Does the trigger photocell switch?
- No: ⇒ Check of a photocell, page 377
- Yes: continue

The entered distance value is correct?
- No: ⇒ Entry of distances, page 292
- Yes: continue

Counter 1 counts every container?
- No: Replace the *basic* CPU card ⇒ basic CPU card T188-BC HBE010190 ST2, page 392
- Yes: continue

⇒ General function check of detection modules, page 378

All or too many containers are rejected

Has the correct container program been selected?
- No → ⇒ Program selection/brand change (in the Operator's Manual)
- Yes ↓

Vertical and horizontal adjustment of the bridges are correct?
- No → ⇒ Program selection/brand change (in the Operator's Manual)
- Yes ↓

The system counts all containers (counter 1)?
- No → **Are all the trigger photocells switching?**
  - No → ⇒ Check of a photocell, page 377
  - Yes → ⇒ Checking the encoder, page 379
- Yes ↓

An extremely high number of faults counted by one detection module (counters 4 to 24)?
- yes → ⇒ General function check of detection modules, page 378
- No ↓

Rejection of more containers than the counted number of faulty containers (counter 3)?
- yes → Check the rejector
- No ↓

Recheck rejector commissioning, repeat the entire commissioning procedure if necessary

No rejection

Is the work/rest switch pressed? — **yes** → Turn the work/rest switch in direction of the arrows

No

Air pressure is lower than 4 bar, for DELTA-K lower than 3 bar for *flip* lower than entered in the Condensed Manual? — **Yes** → Set air pressure for DELTA-K to 3 bar, for other rejectors (except for *flip*) to 4 bar, set values for *flip* according to values entered in Condensed Manual

No

Has the correct container program been selected? — **No** → ⇒ Program selection/brand change (in the Operator's Manual)

Yes

Vertical and horizontal adjustment of the bridges are correct? — **No** → ⇒ Program selection/brand change (in the Operator's Manual)

Yes

The system counts all containers (counter 1)? — **No** → ⇒ Containers are not counted, page 370

Yes

The system counts containers to be rejected (counter 3)? — **Yes** →
⇒ Checking the connection of the DELTA-FW rejector, page 260
⇒ Checking the connection of the DELTA-K rejector, page 262

No

The system detects faulty containers (counter 4 to 24)? — **No** → ⇒ General function check of detection modules, page 378

Yes

Check the commissioning

The pressure check evaluates all containers as faulty

Is the vertical adjustment of the measuring bridge correct?

- No → ⇒ Mechanical adjustment of the pressure measurement sensor, page 288
- Yes ↓

Is the sensor shaft blocked?

- yes → Clean the shaft and make it movable again
- No ↓

The measured value changes when metal is held closely to the sensor?

- yes → **The change is more than 100 points?**
  - yes → Check the commissioning data
  - No ↓
- No ↓

The voltage change at TP2 (A/D converter card) is more than 1 V?

- No → **The voltage change at TP3 (A/D-converter card) is more than 0.2 V when metal is below the sensor?**
  - No → ⇒ Replacement of sensors, photocells and proximity switches, page 401
  - Yes ↓ **The switch S1 (A/D converter card) is in position 2?**
    - No → Change the switch to position 2
    - Yes ↓ Replacement of the A/D converter card on the *basic* CPU card
- Yes ↓

Replace the *basic* CPU card
⇒ basic CPU card T188-BC HBE010190 ST2, page 392

Containers fall during the rejection by the DELTA-FW or DELTA-K rejectors

Question	Answer	Action
Has the correct container program been selected?	No	⇒ Program selection/brand change (in the Operator's Manual)
Yes ↓		
The air pressure is correctly set to 4 bar, for DELTA-K to 3 bar?	No	Set the air pressure to the correct value
Yes ↓		
Containers approach the segments at the correct position?	No	⇒ Vertical adjustment and guide rails, page 259 ⇒ Vertical adjustment and guide rails, page 261
Yes ↓		
Do the containers skid on the conveyor?	yes	Correction of guide rails
No ↓		
The correct container diameter is entered?	No	⇒ Entry of container parameters, page 257
Yes ↓		
Edges between the conveyor and the collection table?	yes	Improve the mechanical guidance of chains
No ↓		
The brushes of the DELTA-FW rejector segments are still in good condition?	No	Replace the sets of brushes
Yes ↓		
The speed measuring is without faults?	No	⇒ Checking the encoder, page 379
Yes ↓		
Speed dependent parameters of the rejector are correctly set?	No	⇒ Rejector function check, page 271
Yes ↓		
Check commissioning, repeat the entire commissioning if necessary		

Segments of the DELTA-FW/DELTA-K rejector extend in between good containers

The bottom photocell is activated?
- No → **Check the rejector installation**
- Yes ↓

The counter of the bottom photocell increases when the segments extend?
- No → **Check the rejector installation**
- Yes ↓

The bottom photocell switches correctly?
- No → **⇒ Check of a photocell, page 377**
- Yes ↓

Large glass fragments or broken containers are on the conveyor?
- yes → **Remove glass fragments in order to avoid the interruption of the photocell**
- No ↓

Check the commissioning, repeat the entire commissioning procedure if necessary

Segment remains retracted or extended

Air pressure is lower than 4 bar, for DELTA-K lower than 3 bar for *flip* lower than entered in the Condensed Manual?

yes → **Set air pressure for DELTA-K to 3 bar, for other rejectors (except for *flip*) to 4 bar, set values for *flip* according to values entered in Condensed Manual**

No ↓

- **Stop the conveyor.**
- **Shut off the compressed air at the stop valve and secure the stop valve to prevent it being inadvertently switched on**
- **Open the cover**

Is the segment jammed?

yes → **Remove glass fragments**

No ↓

A segment can be moved easily?

yes → **Check the air hoses**

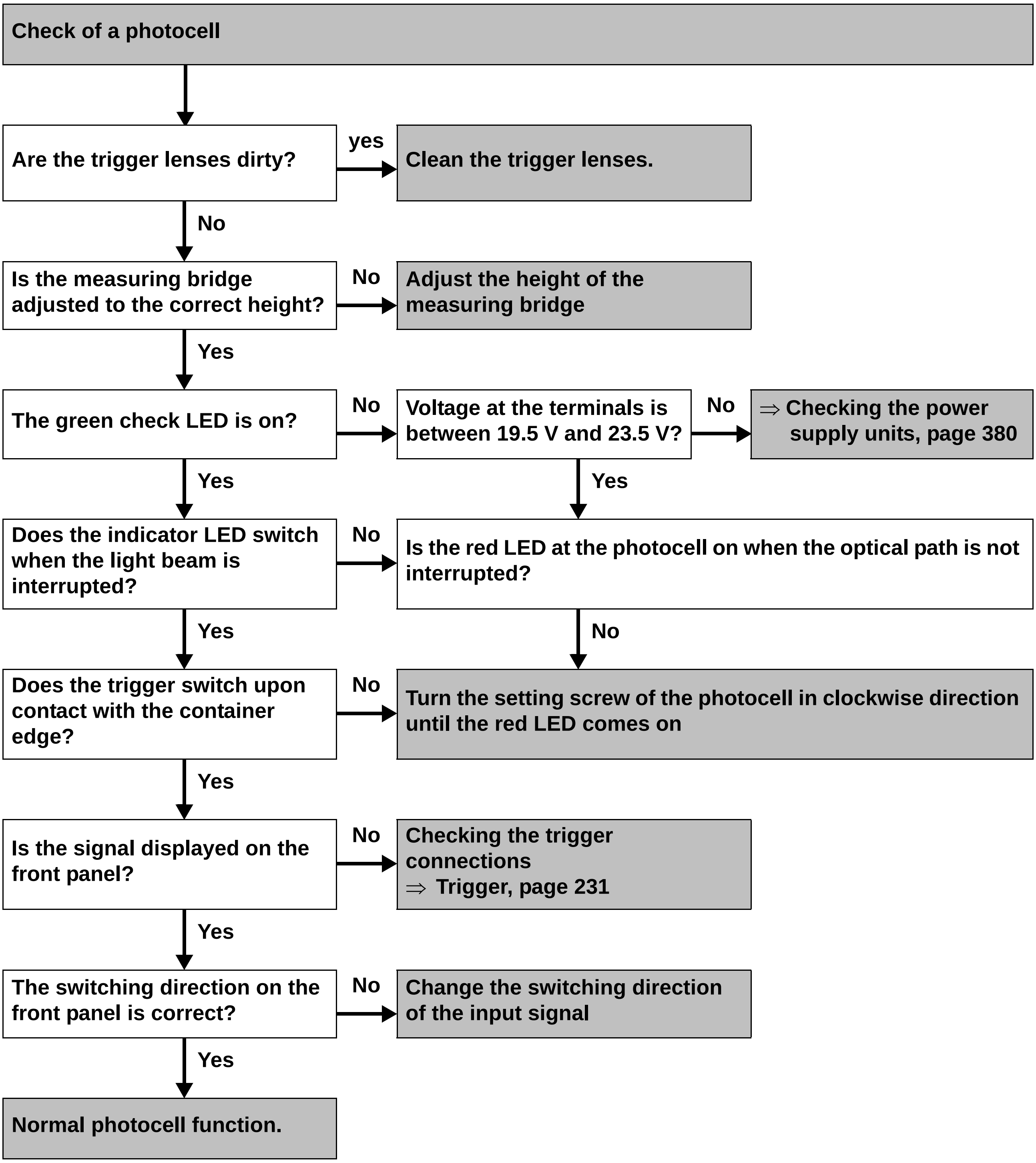
No ↓

Are all cable connections correctly attached?

No → **Reinsert lose cable brackets**

Yes ↓

Recheck the installation, replace the rejector if necessary


Check of a photocell
Are the trigger lenses dirty?
yes
Clean the trigger lenses.
No
Is the measuring bridge adjusted to the correct height?
No
Adjust the height of the measuring bridge
Yes
The green check LED is on?
No
Voltage at the terminals is between 19.5 V and 23.5 V?
No
⇒ Checking the power supply units, page 380
Yes
Yes
Does the indicator LED switch when the light beam is interrupted?
No
Is the red LED at the photocell on when the optical path is not interrupted?
Yes
No
Does the trigger switch upon contact with the container edge?
No
Turn the setting screw of the photocell in clockwise direction until the red LED comes on
Yes
Is the signal displayed on the front panel?
No
Checking the trigger connections
⇒ Trigger, page 231
Yes
The switching direction on the front panel is correct?
No
Change the switching direction of the input signal
Yes
Normal photocell function.

General function check of detection modules

All parts of a detection module are clean?
No → **Clean the detection module, but DO NOT clean the *sonic* sensor**
Yes ↓

Is the detection module active in the detection and reject definitions menu?
No → **Activate detection module (1 = activated)**
Yes ↓

The vertical adjustment is correct?
No → **⇒ Commissioning, Detection modules, page 277**
Yes ↓

Containers pass through the centre of the measuring bridge?
No → **Improve the vertical adjustment of the guide rails**
Yes ↓

Switch on the conveyor
↓

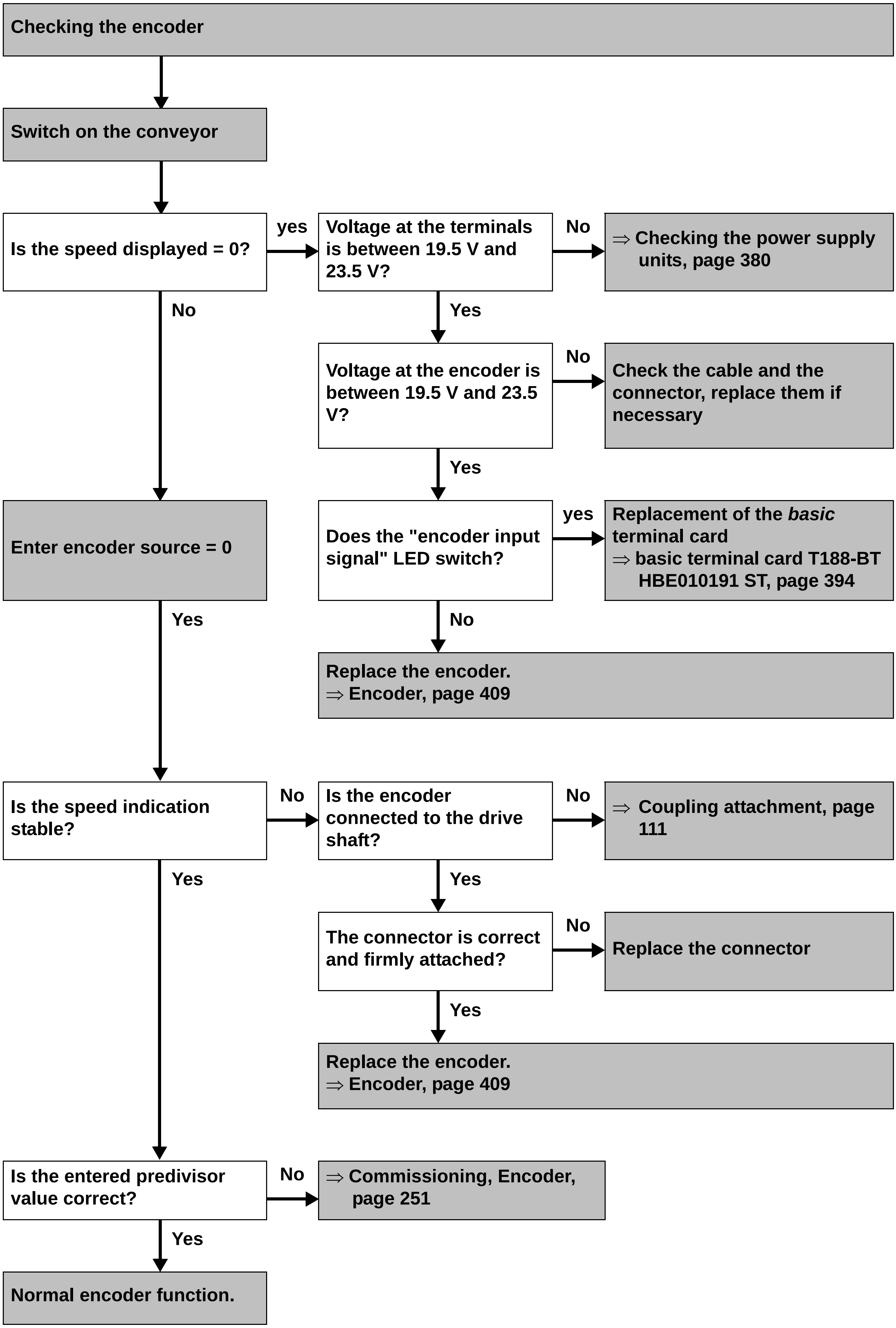
Are new measured values displayed with every passing container?
No → **Check installation and commissioning**
Yes ↓

Is the distance which has been entered correct?
No → **⇒ Entry of distances, page 254**
Yes ↓

Compare the measured values with the limit values.
↓

Is the comparison satisfactory?
No → **⇒ Commissioning**
Revise the limit values
Yes ↓

General function check of detection modules completed


Checking the encoder
Switch on the conveyor
Is the speed displayed = 0?
yes
Voltage at the terminals is between 19.5 V and 23.5 V?
No
⇒ Checking the power supply units, page 380
No
Yes
Voltage at the encoder is between 19.5 V and 23.5 V?
No
Check the cable and the connector, replace them if necessary
Yes
Enter encoder source = 0
Does the "encoder input signal" LED switch?
yes
Replacement of the *basic* terminal card
⇒ basic terminal card T188-BT HBE010191 ST, page 394
Yes
No
Replace the encoder.
⇒ Encoder, page 409
Is the speed indication stable?
No
Is the encoder connected to the drive shaft?
No
⇒ Coupling attachment, page 111
Yes
Yes
The connector is correct and firmly attached?
No
Replace the connector
Yes
Replace the encoder.
⇒ Encoder, page 409
Is the entered predivisor value correct?
No
⇒ Commissioning, Encoder, page 251
Yes
Normal encoder function.

Checking the power supply units

The main power switch is in position 1?
- No → **Switch on the main power switch.**
- Yes ↓

The operating mode is active?
- No → **Start the device from the stand-by mode** → Open the device (screws)
- Yes ↓

Open the device (screws)

The voltage at check point VDC is between 30 V and 43 V?
- No → **The mains supply voltage is correct?**
  - No → **Check the mains connection**
  - Yes → **Danger of electric shock! Check the input circuit breakers F1 and F2** → **Check the transformer and the bridge connected rectifier**
- Yes ↓

The voltage at check point VEX is between 19 V and 35 V?
- No → **Replacement of the *basic* terminal card**
  ⇒ basic terminal card T188-BT HBE010191 ST, page 394
- Yes ↓

The voltage at check point VS0 is between 21.5 V and 23.5V?
- No → **Check left switching power supply unit, replace if necessary**
  ⇒ Switch power supply unit module card PSM5 HBE010189 ST, page 391
- Yes ↓

The voltage at check point +5V is between 5.1V and 5.4V?
- No → **Check right switching power supply unit, replace if necessary**
  ⇒ Switch power supply unit module card PSM5 HBE010189 ST, page 391
- Yes ↓

The voltage at the terminals X107/1, X110/1 and X114/1 is between 19.5 V and 23.5 V?
- No → **Replacement of the *basic* terminal card**
  ⇒ basic terminal card T188-BT HBE010191 ST, page 394
- Yes ↓

Normal function of power supply unit

Maintenance

RB *basic* V8.00

Maintenance

RB *basic* V8.00

General

The design of the device keeps maintenance at a minimum level. There are only a few moving parts and these parts move only when required for operation. This means only very little wear and tear of mechanical components. The remaining maintenance work is limited to the cleaning and check of parts.

Cleaning

Cleaning of device components should be carried out at the usual maintenance intervals for the entire installation. We recommend cleaning at weekly intervals. The degree of contamination may require other intervals.

In general, cleaning is carried out with a damp cloth or a soft brush. All components are protected against splashing water but not hoseproof.

STOP

Never clean the device with a jet of water or other liquids. Penetrating moisture causes damage to the electronic system.

If moisture has penetrated into the device, switch it off or leave it switched-off until it is completely dry again.

Inspections

Inspections are measures of planned preventive maintenance. They are necessary to detect deficiencies or defects in due time. We recommend monthly intervals. Other intervals may be necessary depending on the work load of an installation.

Maintenance plan

In order to ensure the function of the device, the following maintenance must be carried out when required or at weekly, monthly or quaterly intervals. The maintenance instructions are available in the respective chapters of the Operator's Manual to the device.

Components	Component	Every week	Every month	Quarterly	Required work
Standard device	Front panel Protection cover Connections	X			Clean, remove foreign objects.
			X		Check the protection tubes and screw connections for damage.
	Vertical and horizontal adjustment devices		X		Clean, check the easy running, Remove broken glass and foreign objects.
Peripheral equipment	Encoders		X		Check that the connection to the drive shaft is continuous and that the connector is securely fixed.
	Main trigger Additional trigger Reject verification	X			Remove glass fragments and foreign objects, Clean the trigger lenses.
			X		Check the trigger setting
	Jam detector	X			Remove glass fragments and foreign objects, Check whether the bow is easy-running.
	Warning light	X			Clean with a damp cloth.
Detection modules	Fill level detection Closure detection Label detection Residual liquid detection	X			Remove glass fragments and foreign objects, clean sensors and windows of the measuring heads **(not in case of closure detection *sonic*!)** Check the easy running of the supports for the closure detection, pressure and the closure detection *sonic*.
			X		Check the mechanical and electrical sensor setting.
	Continuation of the maintenance plan on the following page				

Components	Component	Every week	Every month	Quarterly	Required work
Rejector	Filter regulator			X	Check the main air connection is securely fixed.
	Protective cover	X			Clean and remove broken glass and foreign objects.
	Pneumatic parts		X		Check the fixed attachment and tightness of cylinders, air hoses and valves, Check the correct attachment of the electrical connections.
	Guide rails	X			Check the distance reduction from the last detection module to the first segment.
	Cylinders and cylinder piston rods			X	Check the damping bumpers and damping nuts of the cylinders and the absorber rubbers of the segments for cracks and fatigue.
	Bottom photocell	X			Clean the sensor and the sensor lens, remove glass fragments and foreign objects.
			X		Check the mechanical and electrical sensor setting.
	Rejection segments	X			Clean, remove glass fragments and foreign objects,
			X		remove plastic burrs from segments and segment tips, check the easy running, check the fixed attachment of the segment tips, check the segment tips for wear and tear

Repairs and overhauls

RB *basic* V8.00

General

Repair or overhaul of the device is necessary when parts fail or when there is considerable wear and tear. Only a specialist with the corresponding technical training is able to carry out the required work. It is recommended to use original HEUFT spare parts when replacing a part, in order to ensure a long-term function of the device. In addition, the HEUFT training department offers training courses at regular intervals which also deal with the replacement of parts.

When repair and overhaul cannot be carried out by the available means, the HEUFT service is available to restore the device function on location as soon as possible. The phone number and e-mail address are listed on page 3.

All components or parts utilised in the device are provided with a part number. This part number is used for ordering the respective spare parts from HEUFT SYSTEMTECHNIK GMBH. The address is listed in the preface chapter. Current prices are available on request.

The following pages deal with the replacement of components or parts in close relation to the trouble shooting procedures and the description of possible malfunctions. Before their mounting, all spare parts must be unpacked. The packaging material must be returned to the material circulation or be collected for recycling.

Maintenance must be carried out when the conveyor is not in operation. When short term repairs are necessary, they must only be carried out when the conveyor is stopped.

Electricians only are authorised to replace electrical components by observing the applicable safety regulations!

Mechanics only are authorised to replace mechanical components!

The replacement of electrical components is described more detailed than the one of mechanical parts because the chapter "Mounting" includes a very detailed assembly description for these components.

Standard device

Front panel with foil HPM180049 ST

When the front panel foil is damaged, e.g. holes in the key or display areas, the entire front panel must be replaced according to the following instructions:

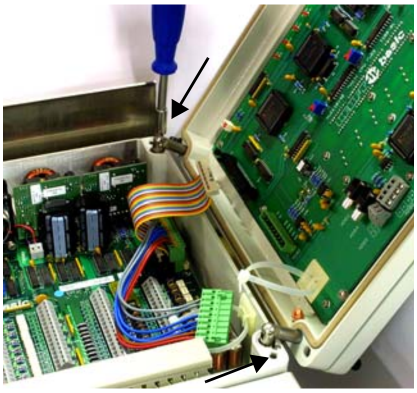
Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the casing.

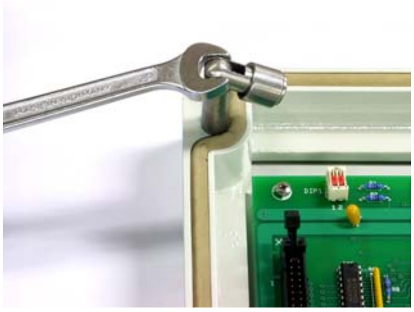
Even after switch-off with the main power switch, the power supply cable has live mains voltage!

2. Check the dead voltage condition (terminals 1 and 3 at the main power switch).
3. Remove all connectors from the terminal strips X201 through X204,
   remove all cables by means of the lever (special tool, ⇒ Page 174) from the terminal strips X205 through X208.
4. Remove the cable binders of the HF , X-ray or Gamma connection cable from the *basic* CPU card.
5. Remove the 5 mm attachment screws of both hinges.

The cover of the casing is now loose and must be held with a hand.



6. Remove the cover of the casing in forward direction.
7. Put the cover onto a soft surface (wooden or plastic plate), the operating side facing downwards.



8. Unscrew the hinges with an open-end key 11 mm.

9. Remove all 18 recessed head screws M3x5 from the *basic* CPU card.

10. Remove the *basic* CPU card.

The foils on the display modules must be protected against dust and grease!

11. Remove all 3 red foils from the display modules.

12. Remove the 4 recessed head screws with a cross screw driver (size 2).

13. Remove the lower part of the frame.

14. Replace the front panel.

15. The assembly of the cover must be carried out in the opposite order.

The thread for the attachment of the hinges in the lower frame part must point to the left!

Before switch-on of the device check the assembly area for forgotten parts and remove them if any!

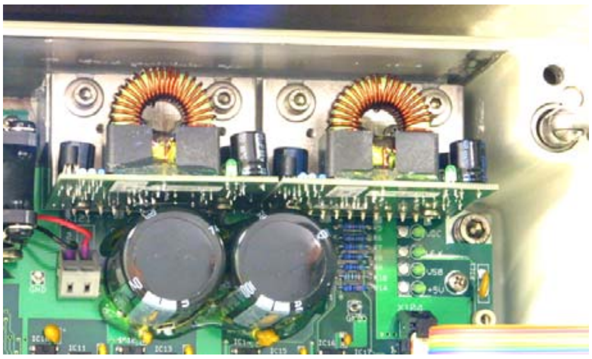
Before the disassembly recheck whether a switch power supply unit is defective.
The left switch power supply unit is inactive in the stand-by mode, the LED is off.
The switch power supply unit is not switched on when the software start is not correct at device start-up!
The right switch power supply unit must be on immediately after switch-on with the main power switch.

Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the casing.

Even after switch-off with the main power switch, the power supply cable has live mains voltage!

2. Check the dead voltage condition (terminals 1 and 3 at the main power switch).



3. Remove both attachment screws and the tooth lock washers of the defective switch power supply unit.

4. Remove the switch power supply unit.

5. Insert the new switch power supply unit and attach it.

The coding protection on both sides of the connector prevents the insertion with the wrong polarity.
Do not force the switch power supply unit into its position!

Before switch-on of the device check the assembly area for forgotten parts and remove them if any!

6. Switch on the device.

The glowing of the light emitting diode indicates that the replacement of the switch power supply unit was correctly carried out.

Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the casing.

Even after switch-off with the main power switch, the power supply cable has live mains voltage!

2. Check the dead voltage condition (terminals 1 and 3 at the main power switch).

3. Remove all connectors from the terminal strips X201 through X204,
remove all cables by means of the lever (special tool, ⇒ Page 174) from the terminal strips X205 through X208.

4. Cut the cable binders.

5. Remove all 18 screws M3x5 mm.

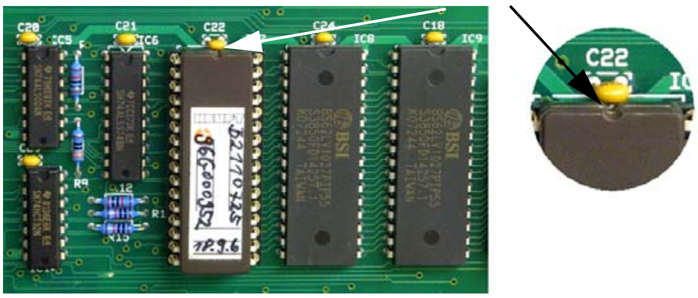
6. Carefully withdraw the CPU card in backwards direction.

The red foils on the display modules must be protected against dust and grease!

7. Remove the EPROM from the old card and insert into the new CPU card.

Pay attention to the EPROM alignment, the groove must point upwards!

Groove



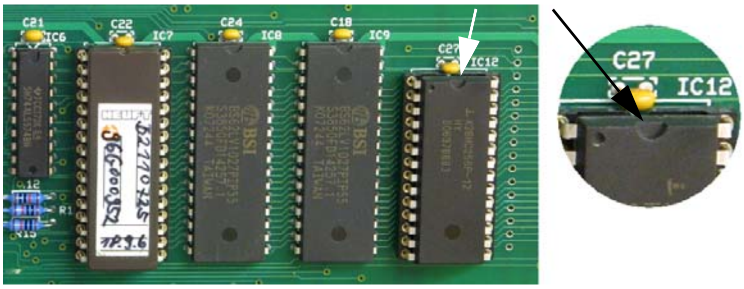
8. Remove the EEPROM from the **new** card.

EPROM EEPROM

9. Remove the EEPROM from the old card and insert into the new CPU card.

Pay attention to the EEPROM alignment, the groove must point upwards!

Groove

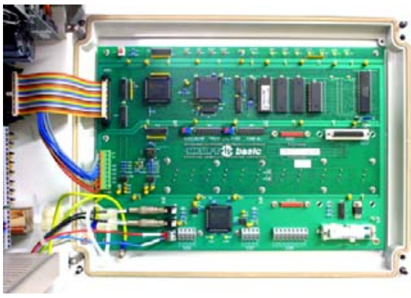


The EEPROM of the old card contains the commissioning data.

10. If the device has a closure detection, pressure remove the A/D converter module and mount it to the new CPU card with 4 screws M3x5 mm.

11. Reinsert the red foils and attach the new CPU card with all 18 screws M3x5 mm.

Before switch-on of the device check the assembly area for forgotten parts and remove them if any!



12. Connect again the cables and connectors removed from the terminal strips X201 to X208.

Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the casing.

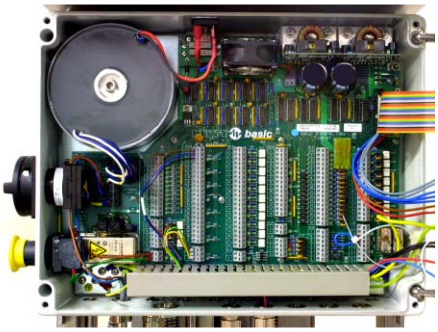
Even after switch-off with the main power switch, the power supply cable has live mains voltage!

2. Check the dead voltage condition (terminals 1 and 3 at the main power switch).
3. Detach the cables W300 and W301 from the main power switch.
4. Remove all cables from terminal X106.
5. Remove the cable of the work/rest switch from terminal X109.
6. Remove the cable from terminal X101.
7. Detach the cable from connectors X104 and X105.
8. Remove both switch power suply units.
9. Remove all cables one after the other from terminals X107-X120.
10. Remove all 15 attachment screws (M3x6 mm).
    - One of the screws is located at the right on top of the fan.
11. The assembly must be carried out in the opposite order.

The attachment screws of the terminal will be mounted without washers, those of the switch power supply units with tooth lock washers.
Attach all cables according to the wiring diagrams.

In case of wrong polarity of the rectifier (terminal X101) some components could be destroyed, recheck all connections (blue conductor to lower terminal)!
Interchanging the connections causes a short circuit of the direct current and the 2A primary fuses of the transformer will be destroyed.

12. Check
    - Connections:
        - Terminal X101 - terminal X106 - main power switch - work/rest switch,
    - Check the setting of the mains voltage select switch.
    - Fuses, both of type 2A, semi time-lag.



Stop the conveyor and lock it out to prevent inadvertent switch-on!
Switch off the power supply by the customer and secure it to prevent it being inadvertently switched on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the casing.

After switch-off, the power supply cable has still live supply voltage when the power supply by the customer is not switched off!

2. Check the dead voltage condition (terminals 1 and 3 at the main power switch).
3. Detach the 4 cables from the bridge connected rectifier.
4. Remove the M6 nut with an 8 mm socket wrench.
5. Remove the bridge connected rectifier.
6. Insert the new bridge connected rectifier.

When installing the new bridge connected rectifier pay attention that the bevelled corner is on top at left.

7. Tighten the M6 nut by hand!
8. Connect the cables,
   - both cables from the transformer must be connected diagonally,
     - top right (~) and bottom left (~),
     - red cable top left (+) and blue cable bottom right (-).

In case of wrong polarity of the rectifier (terminal X101) some components could be destroyed. Recheck all connections (blue conductor to lower terminal)! Interchanging the connections causes a short circuit of the direct current and the 2A primary fuses of the transformer will be destroyed.

Yellow mushroom-shaped push button HPE320167 GE

Switching element, make contact HPE320078 ST

⚠ Stop the conveyor and lock it out to prevent inadvertent switch-on!
Switch off the power supply by the customer and secure it to prevent it being inadvertently switched on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the casing.

⚡ After switch-off, the power supply cable has still live supply voltage when the power supply by the customer is not switched off!

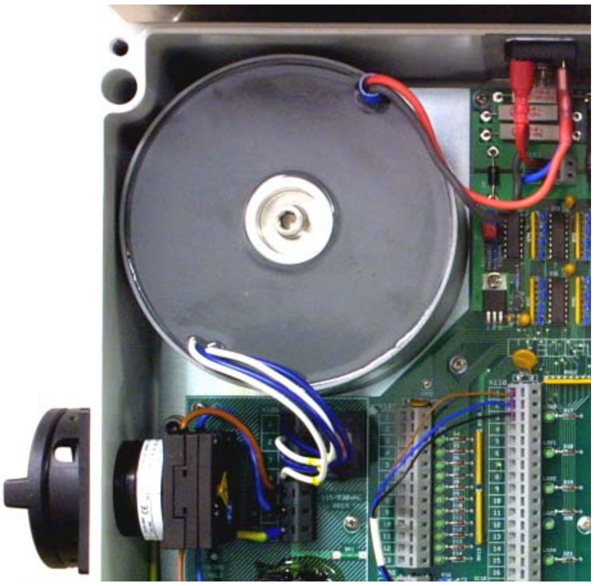
2. Check the dead voltage condition (terminals 1 and 3 at the main power switch).
3. Remove the switching element with a screw driver size 2.
4. Remove the switching element plate from the mushroom-shaped push button by using a screw driver as a lever.
5. Remove the knurled screw of the push button.
6. Remove the push button to the left.
7. Connect the cable to the new switching element.
8. Carry out the installation of the new push button in the opposite order.

Stop the conveyor and lock it out to prevent inadvertent switch-on!
Switch off the power supply by the customer and secure it to prevent it being inadvertently switched on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the casing.

After switch-off, the power supply cable has still live supply voltage when the power supply by the customer is not switched off!

2. Check the dead voltage condition (terminals 1 and 3 at the main power switch).
3. Detach the transformer connections 1 through 4 on terminals X106/ 1 through 4 by using a lever (special tool ⇒ Page 174).
4. Detach the transformer connections W307 and W308 from the bridge connected rectifier.
5. Remove the attachment screw of the transformer with a 6 mm hexagon socket wrench.
6. The new transformer must be installed in the opposite order.



Axial fan 24V; DC HPE440005 ST

Stop the conveyor and lock it out to prevent inadvertent switch-on!
Switch off the power supply by the customer and secure it to prevent it being inadvertently switched on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the casing.

After switch-off, the power supply cable has still live supply voltage when the power supply by the customer is not switched off!

2. Check the dead voltage condition (terminals 1 and 3 at the main power switch).
3. Dismount the terminal card,
⇒ basic terminal card T188-BT HBE010191 ST, page 394.
4. Detach the cables from the fan.
5. Remove the attachment screws of the fan.
6. The new fan must be installed in the opposite order.

Pay attention to the correct polarity of the cables!

Cable harness for power supply HBE110001 ST

Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the casing.
2. Detach the connectors of the cable harness for the power supply BCPU BA-NO.1 at both ends.
3. Connect the new cable harness.

Both connectors have a reverse protection. Do not insert them by force!

4. Close the cover of the casing.

Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the casing.
2. Remove both connectors by actuating the ejector at the socket casing.
3. Insert the new cable.

Both connectors have a reverse protection. Do not insert them by force!

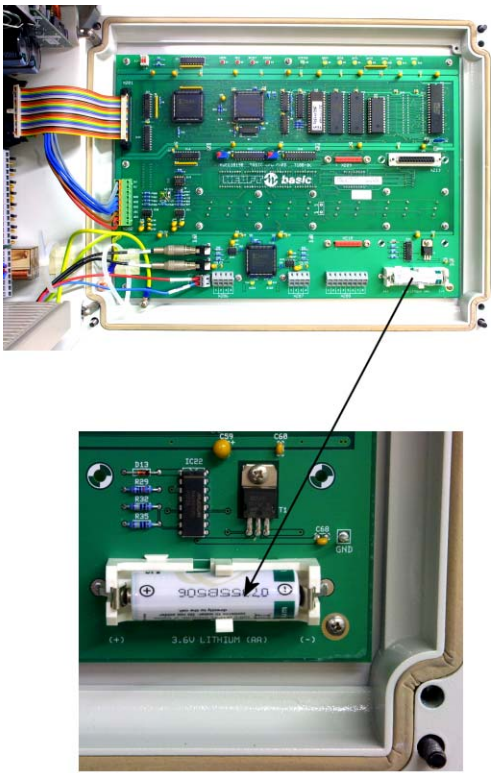
4. Close the cover of the casing.

Battery

1. Write down the counter readings and the program number because the battery for the saving of RAM data will be removed and the display will be lost.

Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

2. Open the cover of the casing.
3. Remove the battery from its support.
4. Insert the new battery.
5. Close the cover of the casing.
6. Switch on the device.
7. Select the program.



Vertical adjustment device HBM000020 ST

⚠ Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

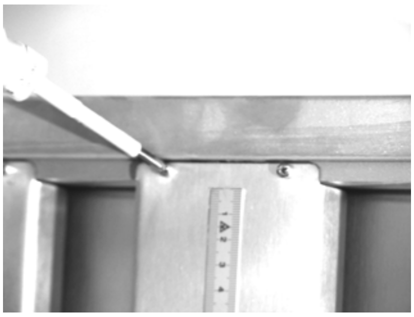
1. Open the cover of the casing.

2. Unscrew the clamping lever from the bridge.

3. Remove the bridge and lay it aside, secure it against falling down!

4. Remove the height indicator,
   - remove the screws of the height indicator with a cross screw driver size 1.

5. Remove the protection sheets,
   - remove the 4 screws of each protection sheet right and left of the bracket with a cross screw driver size 1.

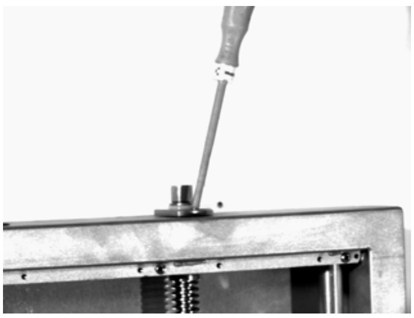


6. Loosen the upper stud screw of the guide shaft,
   - with hexagon socket wrench 3 mm.

7. Remove the hexagon socket screw from the guide shaft,
   - from below with a hexagon socket wrench 5 mm.

8. Remove the 4 hexagon socket screws of the mounting plate with a hexagon socket wrench 6 mm.

9. Remove both screws of the upper threaded spindle attachment,
   - with cross screw driver size 2.



10. Unscrew the spindle in upwards direction by means of the crank.

11. Pull the guide shaft downwards and remove it together with the bracket at the lower side.

12. The assembly of the new vertical adjustment device must be carried out in the opposite order
    ⇒ Mounting the vertical adjustment device, page 99.

Detection modules

General

The replacement of defective sensors (photocells and proximity switches) requires technical knowledge and manual skills. In case of mechanical disturbances it is recommended to call the HEUFT service or to replace the detection module completely.

In the case of the **optical and inductive closure detection modules** merely the plug contacts at the sensor must be loosened, and the sensor must be replaced.

When replacing **other detection modules and sensors** it is necessary to detach all the cables of the detection module and to loosen the armoured conduit fittings.

For the replacement of sensors, additional hardware such as wire end sleeves, a heat-shrinkable sleeve and appropriate tools is required.

Replacement of sensors, photocells and proximity switches

Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

In the case of the optical and inductive closure detection modules the sensor can be replaced by unscrewing the measuring head. The disassembly of the measuring bridge is NOT required!
After their mounting, the sensors of the inductive closure detection for bottles and cans and of the closure detection, pressure do not require further adjustments.

In case of optical fibre photocells, it is absolutely necessary that the optical fibre is first detached before carefully withdrawing the photocell out of the measuring bridge.
Excessive bending of the optical fibres could limit the function of a photocell considerably!
The transmitting and receiving optic parts must in no case be detached!

1. Open the cover of the casing.
2. Detach all connections to a sensor from the terminal card and the CPU card.
   In case of the closure detection *sonic*, remove all connections between the terminal box and the device.
3. Loosen the armoured conduit fitting.
4. Remove the detection module from the horizontal adjustment device.
5. Pull off the armoured conduit fitting hose.
6. Remove the elbow of the armoured conduit fitting from the detection module.
7. Detach the two optical fibres to the lenses from the photocell.
8. Unscrew the sensor and pull out the cable.
9. The assembly of the new sensor must be carried out in the opposite order.
10. The sensor must then be set according to the installation instructions
    ⇒ Installation chapter Measuring bridges for detection modules, page 183.

Fill level detections (BA) / residual liquid detections (VF)

Gamma measuring bridge (option BA) **HBE210043**

Gamma measuring bridge (option VF) **HBE210115**

The measuring bridges contain a radioactive radiation source (gamma radiation).

Radioactivity!
Manipulations at the radiation source are prohibited.
ONLY persons trained and licensed by HEUFT Company for the repair of radioactive devices are authorised to repair a defective radiation unit.
Dismounting and shipping of the Gamma measuring bridge is prohibited!

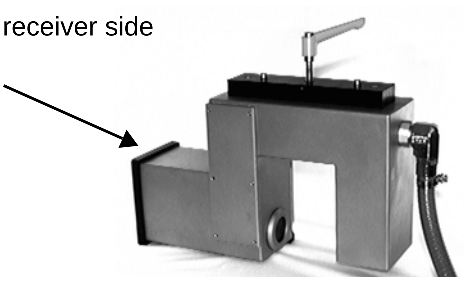
Gamma radiation unit (BA and VF) **HBF150001**

The shipping of radioactive sources is subject to special regulations. If shipping of a Gamma radiation unit to HEUFT Company is required, please contact us **prior** shipping.
Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the detection area.

Close the shutter with both shutter switches, the green light must come on, only then

Switch off the device with the main power switch and lock it out to prevent inadvertent switch-on!

Rack on the receiver side



Gamma measuring bridge (BA)

Receiver

1. Unscrew the 4 recessed screws 8 mm of the black cover with a screw driver for recessed screws size 2 and remove the cover.
2. Remove the two hexagon socket screws from below with a hexagon socket wrench 5 mm,
   - do not lose the plastic washers!
3. Remove the receiver in rearward direction.
4. Disconnect the plug.
5. The new receiver must be installed in the opposite order.

Never operate the measuring bridge without the receiver. Otherwise, gamma radiation can penetrate through the measuring bridge without any obstruction!

Fill level detections (BA)

X-ray measuring bridge HBE211131

The measuring bridge includes an X-ray generator.

X-radiation
Work on the generator unit is prohibited.
ONLY persons trained and licensed by HEUFT Company for the repair of X-radiation devices are authorised to repair a defective generator unit.
ONLY persons trained and licensed by HEUFT Company for repair of x-raying devices are authorised to open the measuring bridge on the emitter side.
Dismantling and shipping of the X-ray measuring bridge is prohibited!

X-ray receiver unit HBE211000 QU2

Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the detection area.
Close the shutter with both shutter switches, the green light must come on, only then
switch off the device with the main power switch and lock it out to prevent inadvertent switch-on!

Rack on the receiver side

X-ray measuring bridge (BA)

Receiver rack

1. Unscrew the six countersunk bolts of the casing cover and remove the cover.

2. Remove the two hexagon socket screws from below with a hexagon socket wrench 5 mm,
   - do not lose the plastic washers!

3. Remove the receiver in rearward direction.

4. Disconnect the plug.

5. The new receiver must be installed in the opposite order.

Never operate the measuring bridge without the receiver. Otherwise, X-radiation can penetrate through the measuring bridge without any obstruction!

HF measuring bridge (optional) — HBE210042 KT/LT

The HF measuring bridge can only be replaced as complete unit. The casing cannot be opened.

⚠ Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Disconnect the cable.
2. Loosen the armoured conduit fitting.
3. In case of type HBE210042 KT loosen the earth cable from the conveyor.
4. Unscrew the clamping lever.
5. Remove the bridge.
6. Mount the new measuring bridge,

   ⇒ chapters "Mounting" (Mounting the measuring bridge, page 105) and "Installation" (HF measuring bridge (optional), page 194).

The replacement of defective sensors (photocells and proximity switches) requires technical knowledge and manual skills. In case of mechanical disturbances it is recommended to call the HEUFT service or to replace the detection module completely.

When replacing the detection modules or individual sensors it is necessary to detach all cables of the detection module and to loosen the armoured conduit fittings. For the replacement of sensors, additional hardware such as wire end sleeves, a heat-shrinkable sleeve and appropriate tools is required.

⚠ Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Open the cover of the control unit casing.

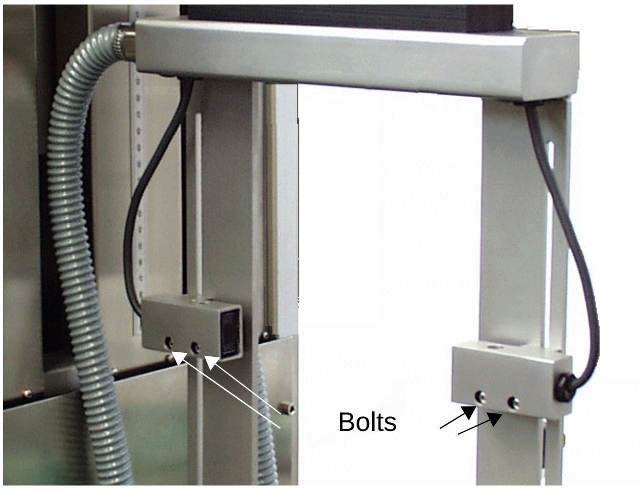
2. Remove all connections to the photocell on the terminal card (⇒ Installation, Infrared measuring bridge, page 200).

3. Loosen the armoured conduit fitting.

4. Remove the detection module from the horizontal adjustment device.

5. Pull off the armoured conduit fitting hose.

6. Screw off the emitter and receiver of the photocell and push it out in forward direction.



7. Pull out the cable.

8. Carry out the mounting of the new photocell in the opposite order.

9. Connect and adjust the photocell according to the installation instructions (⇒ Installation, Infrared measuring bridge, page 200).

Residual liquid detection (VF)

HF measuring head, transmitter HBE211049

HF measuring head, receiver HBE211050

The measuring heads can be replaced as single units.

⚠ Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Disconnect the cable.
2. Loosen the armoured conduit fitting.
3. Unscrew the casing of a measuring head.
4. Insert the new casing of a measuring head,

   ⇒ chapters "Mounting" (Mounting the residual liquid detection HF (optional), page 106) and "Installation" (Residual Liquid Detection (VF), page 202).

Rejector

General

Repairing the rejectors is described in detail in the maintenance manuals for the rejectors. You can order the maintenance manuals by means of the article number of the spare parts list (⇒ spare parts list on device CD *basic* delivered with the Operator's Manual *basic*).

Laning (VF)

Jam detector (optional)

Part number: HBE210114 ST

Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the area where the jam detector is mounted.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Loosen the nuts of the attachment screws.
2. Loosen the armoured conduit fitting.
3. Remove the defective jam detector from the guide rails.
4. Mount the new jam detector: ⇒ Mounting of a jam detector, page 121.
5. Install the new jam detector: ⇒ Jam detector (optional), page 241.

Peripheral equipment

Encoder

Part number: HPE700001 ST

Stop the conveyor and lock it out to prevent inadvertent switch-on!
Clear the conveyor in the area of detection modules.
Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Remove all four screws of the cover and remove the cover.
2. Loosen the attachment screw of the electrical connector and remove the connector.
3. Loosen the stud screw of the coupling at the encoder shaft with a hexagon socket wrench 2 mm.
4. Remove the 3 attachment screws of the encoder with an open-jawed wrench SW10.
5. The new encoder must be installed in the opposite order.

   ⇒ Mounting the encoder, page 110.

Warning light (optional)

Light bulb — HPE420016 ST

Switch off the device with the main power switch and secure it to prevent it being inadvertently switched on!

1. Remove the black plastic cover in upwards direction.
2. Unscrew the lamp element with a screw driver.
3. Replace the light bulb.
4. Attach the lamp element,
   - the arrow on the lamp element must be coincident with the line on the lower part.
5. Tighten the screws of the lamp element.
6. Attach the plastic cover.

Shutdown

Preparations

General

The disassembly of the entire bottling line or a modification of the production area requires the disassembly of the device.
Disassembly must be carried out by an electrician. Temporary help by another person is required. All modules can be moved without the utilisation of hoists.

In general, the device must be disassembled in the opposite order as it was assembled according to the description in the "Mounting" chapter.
Prior to starting the disassembly read through the complete "Shutdown" chapter.

In case of a modification of the production area, the device must be stored intermediately during the reconstruction phase. Provide a sufficient amount of packaging material (e.g. boxes) to protect the device.

Depending on the desired type of disassembly for the device, there are two different options. Disassembly with the aim of reassembling the device at a new bottling line or disassembly for the disposal of the device. In either case, the present chapter must be used as a guide line. Disposal is subject to country specific laws which must be followed.

Tool list

The following tools are required for the quick and correct disassembly of the device:

Hammer	
1 set of screw drivers each	- flat - crossed
1 set of wrenches each	- hexagon socket - open-jawed - ring

Safety information

The following regulations have to be observed for disassembly:

When working at the device, stop the conveyors and lock them out to prevent inadvertent switch-on!

Danger of electric shock!
Switch-off the voltage of the power supply cable according to DIN VDE 0105:
- cut the voltage of the supply cable
- lock it out to prevent inadvertent switch-on, e.g. by removing the circuit breakers or attaching a prohibitive sign!
- check the dead voltage condition, e.g. with a voltmeter
- use a shorting bar to prevent inadvertent switch-on

Rejector
Shut off the compressed air at the stop valve and secure the stop valve to prevent it being inadvertently switched on!

Radioactivity!
ONLY persons trained and licensed by HEUFT Company for the repair of radioactive devices are authorised to disassemble devices equipped with a Gamma measuring bridge.
Customer personnel are not authorised to open the measuring bridge on the radiation side!

X-radiation!
ONLY persons trained and licensed by HEUFT Company for the repair of X-radiation devices are authorised to disassemble devices equipped with an X-ray measuring bridge.
Customer personnel are not authorised to open the measuring bridge on the generator side!

Dismounting

General

For the purpose of intermediate storing the device must be appropriately packaged. Especially the measuring bridges and protruding parts must be protected to prevent their damage.

Disassemble the components of the device in the following order:

- Disconnect and remove the mains supply cable
- Remove the peripheral devices
- Remove the rejector
- Remove the machine detection modules
- Remove the measuring bridges for detection modules
- Remove the vertical adjustment devices from the standard device
- Remove the standard device from the conveyor
- Close the gaps in the guide rails again

Dismounting of parts

1. Disconnect and remove the mains supply cable

Danger of electric shock!
Electricians only are authorised to do work at the power supply cable!

1.1. Disconnect the voltage of the mains supply cable:

- Cut the voltage of the supply cable,
- Lock it out to prevent inadvertent switch-on,
- for example by removing the circuit-breakers or attaching a prohibitive sign,
- Check the dead voltage condition, e.g. with a voltmeter.

1.2. Switch off the main power switch.

1.3. Open the cover of the casing.

1.4. Disconnect and remove the mains supply cable.

2. Detaching the armoured conduit fittings

When working in the conveyor area, switch-off the conveyor and lock it out to prevent inadvertent switch-on!

2.1. Remove all cables of the standard device from the terminals by using the lever (special tool, ⇒ Page 174).

2.2. Open the cable duct and expose the cable loops.

2.3. Unscrew the hoses from the armoured conduit fittings and remove them in downwards direction.

2.4. Close all openings in the bottom of the casing with PG-dummy plugs and packing ring.

2.5. Tighten the cover of the casing correctly with screws.

3. Remove the peripheral devices

When working in the conveyor area, switch-off the conveyor and lock it out to prevent inadvertent switch-on!

3.1. Remove the encoder and store it in packaged condition.

3.2. Remove the additional trigger and the reject verification trigger and store them in packaged condition.

3.3. Remove the warning light and store it in packaged condition.

3.4. Remove the jam detectors and store them in packaged condition.

4. Remove the rejector

When working in the conveyor area, switch-off the conveyor and lock it out to prevent inadvertent switch-on!

4.1. Shut off the compressed air at the stop valve and secure the stop valve to prevent it being inadvertently switched on!

4.2. Disassemble the rejector and store it in packaged condition.

5. Remove the machine detection modules

When working in the area of machines, switch off the machines and lock them out to prevent inadvertent switch-on!

Remove all sensors and supports in the machine area and store them in packaged condition.

6. Remove the measuring bridges for detection modules

ONLY persons trained and licensed by HEUFT Company for the repair of radioactive devices are authorised to dismount devices equipped with a Gamma measuring bridge for fill level detection or residual liquid detection.

Customer personnel are not authorised to open the radiation side of a measuring bridge!

The supervising authority that has given approval for the operation of a Gamma measuring bridge will also decide the type and location of storage of this bridge.

ONLY persons trained and licensed by HEUFT Company for the repair of X-radiation devices to the fill level detection are authorised to disassemble devices equipped with an X-ray measuring bridge.

Customer personnel are not authorised to open the measuring bridge on the generator side!

The supervising authority that has given approval for the operation of an X-ray measuring bridge will also decide the type and location of storage of this bridge.

Remove all measuring bridges by loosening the clamping lever on the horizontal adjustment device and store them packaged in the respective protection foil.

7. Removal of the standard device

7.1. Detach the standard device from the conveyor.

7.2. Detach the standard device from the bow.

7.3. Remove the standard device and store it in packaged condition.

7.4. Detach the reflector of the bottom photocell for the DELTA-FW rejector from the bow and store it in packaged condition.

7.5. Detach the bow from the conveyor and store it in packaged condition.

8. Final disassembly

8.1. Remove the mains supply cable until the circuit breakers by the customer.

8.2. Remove the compressed-air supply back to the air distribution box.

8.3. Close the gaps in the guide rails.

Waste disposal

Disposal of the Gamma measuring bridge

ONLY persons trained and licensed by HEUFT Company for the repair of radioactive devices are authorised to dismount devices equipped with a Gamma measuring bridge for fill level detection or residual liquid detection.

Customer personnel are not authorised to open the measuring bridge on the radiation side!

The customer must strictly adhere to the applicable regulations of the supervising authority (e.g. storage until disposal)!

The following is required for the disposal of a Gamma measuring bridge:

1. Prior to the disposal the customer must have a testing authority (e.g. TÜV for Germany) carry out a tightness test. A measuring bridge can only be disposed of if this tightness test was satisfactory. If the tightness test was unsatisfactory, the customer must carry out all measures as prescribed by the supervising authority in the operating permission.

2. File an application for the disposal of the measuring bridge either with the local collecting point (in Germany: regional collecting point of the respective federal agency) or with HEUFT SYSTEMTECHNIK GMBH. The application must be filed within six month after the tightness test.

3. After the approval the customer can dispose of the radiation source certified with a tightness test either via the competent collecting point or via HEUFT SYSTEMTECHNIK GMBH.

Disposal of the X-ray measuring bridge

ONLY persons trained and licensed by HEUFT Company for the repair of X-radiation devices to the fill level detection are authorised to disassemble devices equipped with an X-ray measuring bridge.

Customer personnel are not authorised to open the measuring bridge on the generator side!

The customer must strictly adhere to the applicable regulations of the supervising authority (for example storage until disposal)!

The following is required for the disposal of an X-ray measuring bridge:

1. The customer must immediately notify the competent authority when terminating the service with an X-ray measuring bridge.

2. After the disassembly as described on Page 420, a measuring bridge must be disposed of as electronic component in dead voltage condition and without any endangering.

Disposal of components and parts

Electronic components must be separated from mechanical components in order to ensure an appropriate disposal.

Plastic and metal parts are collected for recycling.

Printed circuit boards, batteries, sensors, cables etc. must be disposed of separately.

Appendix

Sample of parameter sheets

Device parameters	*basic* BA	Part 1
V8.0		
Customer:	Device number:	Date:

Definition of distances (UF = underfill, OF = overfill)

No.	Parameter	Value	Default value
1	machine, begin - end [pls]		511
2	machine, container presence - end [pls]		191
3	machine, synchronisation signal - end [pls]		255
4	number of filler valves		120
5	machine, container presence - Bottle Burst [pls]		10
7	machine, container presence - underfill check [pls]		20
8	machine, container presence - shower [pls]		25
9	machine, label 1 - end [pls]		127
10	machine, label 2 - end [pls]		111
11	machine, label 3 - end [pls]		95
12	machine, label 4 - end [pls]		79
13	machine, label 5 (foil) - end [pls]		63
14	machine, external signal - end [pls]		15
21	machine end - main trigger, conveyor [mm]		128
22	conveyor, main trigger - bridge closure detection inductive/optical/pressure/*sonic* [mm]		0
23	conveyor main trigger - bridge fill level detection 1 (UF) / HF [mm]		120
24	conveyor main trigger - bridge fill level detection 2 (OF) / label detection [mm]		240
25	conveyor, main trigger - external signal [mm]		300
26	conveyor, main trigger - bottom photocell [mm]		280
27	conveyor, main trigger - rejector [mm]		1000
28	conveyor, main trigger - trigger 2 [mm]		700
29	conveyor, main trigger - trigger 3 [mm]		1200
30	conveyor, main trigger - counters [mm]		1500
31	conveyor, main trigger - end [mm]		2000

Definition of encoder values

No.	Parameter	Value	Default value
1	current speed [mm/s]		
2	cycle source (0=encoder/1=internal)		0
3	nominal internal speed value [mm/s]		500
4	measuring distance for predivisor measurement [mm]		640
5	result of the predivisor measurement [pls/64mm]		
6	predivisor [pls/64mm]		128

Definition of count signals

No.	Parameter	Value	Default value
1	serial fault, standard (0-15)		0
2	serial fault, labeller (0-15)		0
3	Locator, filler valve detector (0-15)		0
4	switch-off pulse, conveyor (0=deactivated/1=activated)		1
5	switch-off pulse, machine (0=deactivated/1=activated)		1
6	pulse type of count signals (0=edge triggering/ 1=pulse triggering)		0
7	pulse length [ms]		20
8	reduction factor		1
9	counter output 1 (0=deactivated)		0
10	counter output 2 (0=deactivated)		0
11	counter output 3 (0=deactivated)		0
12	counter output 4 (0=deactivated)		0
13	input, clear counters (0=deactivated/1=activated)		1
14	output, clear counters (0=deactivated/1=activated)		1
15	choice list, Bottle Burst check (0=3/1/1, 1=5/3/1)		1

Masking of input signals (XRL-masks)

No.	Parameter	Value	Default value
1	Inputs 8 - 1		00000010
2	Inputs 16 - 9		00000000
3	Inputs 24 - 17		10000111
4	Inputs 32 - 25		00000001

Masking of output signals (XRL-masks)

No.	Parameter	Value	Default value
1	Outputs 8 - 1		00000000
2	Outputs 16 - 9		00000000
3	Outputs 24 - 17		10101111
4	Outputs 32 - 25		00000000

Definition of container parameters

No.	Parameter	Value	Default value
1	Copy parameters to the current program		1 01
2	Mask of used programs 8 - 1 (0=vacant, 1=used)		00000001
3	Mask of used programs 16 - 9 (0=vacant, 1=used)		00000000
4	Brands, external check (0=manual, 1=external)		00000000

Detection parameters	*basic* BA	Program number	
V8.0		Part 1	

Customer:	Device number:	Date:

General container parameters

No.	Parameter	Value	Default value
1	neck diameter [mm]		30
2	body diameter [mm]		60

Parameters of the fill level detection (UF = underfill check, OF = overfill check)

No.	Parameter	Value	Default value
1	length of measuring window Gamma UF / X-ray UF / HF [mm]		20
2	limit value for Gamma UF / X-ray UF / HF UF		100
3	last measured value Gamma UF / X-ray UF / HF		
4	length of measuring window Gamma OF / X-ray OF [mm]		20
5	limit value for Gamma OF / X-ray OF / HF OF		848
6	last measured value Gamma OF / X-ray OF		
7	minimum frequency for bridge Gamma UF / X-ray UF / HF		
8	maximum frequency for bridge Gamma UF / X-ray UF / HF		
9	current frequency for bridge Gamma UF / X-ray UF / HF		
10	minimum frequency for bridge Gamma OF / X-ray OF		
11	maximum frequency for bridge Gamma OF / X-ray OF		
12	current frequency for bridge Gamma OF / X-ray OF		
13	gap value reference rate for bridge Gamma UF / X-ray UF / HF		150
14	gap value reference rate for bridge GAMMA OF / X-ray OF		150
15	automatic shutter control (0=deactivated/1=activated)		0
16	gap for automatic shutter control (Gamma / X-ray) [mm]		300/1000
17	gap value X-ray UF		
18	gap value X-ray OF		
19	monitoring of gap value X-ray (0 = 30 min., 1 = 4 h, 2 = no message)		0
20	automatic measurement of gap value (1 = deactivated, 0 = activated)		0
21	length of meas. window infrared underfill [mm]		20
22	pulse evaluation (0=bad/1=good)		1
23	lower limit for number of pulses		1
24	upper limit for number of pulses		127
25	last measured value		
26	length of meas. window infrared overfill [mm]		20
27	pulse evaluation (0=bad/1=good)		1
28	lower limit for number of pulses		1
29	upper limit for number of pulses		127
30	last measured value		

Parameters of the closure detection

No.	Parameter	Value	Default value
1	length of measuring window, closure presence [mm]		20
2	pulse evaluation (0=bad/1=good)		1
3	lower limit for number of pulses		1
4	upper limit for number of pulses		127
5	last measured value		
6	length of measuring window, excessive height [mm]		20
7	pulse evaluation (0=bad/1=good)		1
8	lower limit for number of pulses		1
9	upper limit for number of pulses		127
10	last measured value		
11	lower limit of the pressure sensor measuring range [mV]		150
12	upper limit of the pressure sensor measuring range [mV]		530
13	length of measuring window, pressure measurement [mm]		30
14	limit value for "pressure too low"		80
15	limit value for "pressure too high"		120
16	evaluation mode (0=min/1=max)		0
17	limit value for canted closure		30
18/L	measured value, pressure		
18/R	measured value, canted closure		

Detection parameters *basic* BA Program number

V8.0 **Part 2**

Device status/messages

			Default value
6	operating hours counter		

Parameters of the label detection

only for label detection at the conveyor, except for pulse evaluation also for label detection in the machine

1	length of measuring window, label 1 [mm]		20
2	pulse evaluation (0=bad/1=good)		1
3	lower limit for number of pulses		1
4	upper limit for number of pulses		127
5	last measured value		
6	length of measuring window, label 2 [mm]		20
7	pulse evaluation (0=bad/1=good)		1
8	lower limit for number of pulses		1
9	upper limit for number of pulses		127
10	last measured value		
11	length of measuring window, label 3 [mm]		20
12	pulse evaluation (0=bad/1=good)		1
13	lower limit for number of pulses		1
14	upper limit for number of pulses		127
15	last measured value		
17	pulse evaluation, label 4 in the machine (0=bad/1=good)		1
21	length of measuring window, label 5 (foil) [mm]		20
22	pulse evaluation (0=bad/1=good)		1
23	lower limit for number of pulses		1
24	upper limit for number of pulses		127
25	last measured value		

Detection and reject definitions (0=deactivated, 1=activated)

1	container presence		0
2	forced underfill Bottle Burst		0
3	shower Bottle Burst		0
4	fill level detection, underfill check		0
5	fill level detection, overfill check (0=deactivated, 1=activated, 2=counting only)		0
6	label detection 1		0
7	label detection 2		0
8	label detection 3		0
9	label detection 4		0
10	label detection 5 (foil)		0
11	closure detection, presence		0
12	closure detection, excessive height/canted closure		0
13	closure detection *sonic*, frequency too low		0
14	closure detection *sonic*, frequency too high/pressure		0
15	Bottle Burst detection		0
19	signal acceptance		0

Parameters of the closure detection *sonic*

			Default value
1	delay distance [mm]		40
2	microphone gain		128
3	start of frequency measurement		3
4	end of frequency measurement		5
5	start of energy measurement		100
6	length of energy measurement		300
7	threshold value for 1st zero crossing		60
8	trigger source (0=normal, 1=internal)		0
10/L	measured value, relative frequency		
10/R	limit value for "frequency too low"		6000
11	limit value for "frequency too high"		8000
12/L	measured value, amplitude		
12/R	threshold for amplitude		20
13/L	measured value, energy		
13/R	limit value for "energy too low"		300
14	limit value for "energy too high"		1000
15/L	measured value, frequency		
15/R	dynamic tracking of the frequency?		0
16	start new formation of mean values?		0
17/L	mean frequency value		
17/R	dynamic reference frequency		7000
18/L	maximum value of mean frequency		
18/R	minimum value of mean frequency		

Parameters of the rejector

1	maximum number of segments		10/16
2	minimum number of segments		5
3	minimum switching speed [mm/s]		300
4	maximum switching speed [mm/s]		1400
5	counter reading of bottom photocell		
6	bottom photocell (0=deactivated/1=activated)		0
7	stand time *mono/pusher* [ms]		25
8	drive time *mono/pusher* [ms]		10
9	display of the reject situation		
10	selection DELTA-FW/DELTA-K (0=deactivated/ 1=FW 10 seg./ 2=FW 10 seg.M/ 3=FW 16 seg./ 4=FW 16 seg.M/ 5=K/ 6=K-M / 7=FW 10 seg. SM/ 8=FW 16 seg. SM / 9=K SM / 10=FW Fast 10 seg. M / 11=FW Fast 10 seg. SM)		0
14	pilot control time: valve downwards		23
15	pilot control time: valve upwards		23
16	shifting of the activation		0
17	display of the *flip* status: 0=piston down, 1=piston up		

Parameters of the signal acceptance

1	pulse evaluation (0=bad/1=good)		1
2	pulse type (0=pulse, 1=constant level)		0
3	lower limit for signal length [ms]		30
4/L	counter “signal too early”		
4/R	last measured value, delay [ms]		
5/L	maximum measured value, delay [ms]		
5/R	minimum measured value, delay [ms]		
6/L	counter “signal too long”		
6/R	last measured value, signal length [ms]		
7/L	maximum measured value, signal length [ms]		
7/R	minimum measured value, signal length [ms]		

Device parameters	*basic* VF	Part 1
V2.0		
Customer:	Device number:	Date:

Definition of distances

			Default value
1	machine, begin - end [pls]		511
14	machine, external signal - end [pls]		15
21	machine end - main trigger, conveyor [mm]		128
22	conveyor, main trigger – bridge, closure detection [mm]		0
24	conveyor, main trigger – bridge, residual liquid detection [mm]		240
25	conveyor, main trigger - external signal [mm]		300
26	conveyor, main trigger - bottom photocell / laning [mm]		280
27	conveyor, main trigger - rejector [mm]		1000
28	conveyor, main trigger - trigger 2 [mm]		700
29	conveyor, main trigger - trigger 3 [mm]		1200
30	conveyor, main trigger - counters [mm]		1500
31	conveyor, main trigger - end [mm]		2000

Definition of encoder values

1	current speed [mm/s]		
2	cycle source (0=encoder/1=internal)		0
3	nominal internal speed value [mm/s]		500
4	measuring distance for predivisor measurement [mm]		640
5	result of the predivisor measurement [pls/64mm]		
6	predivisor [pls/64mm]		128

Definition of count signals

1	serial fault, standard (0-15)		0
4	switch-off pulse, conveyor (0=deactivated/1=activated)		1
6	pulse type of count signals (0=edge triggering/ 1=pulse triggering)		0
7	pulse length [ms]		20
8	reduction factor		1
9	counter output 1 (0=deactivated)		0
10	counter output 2 (0=deactivated)		0
11	counter output 3 (0=deactivated)		0
12	counter output 4 (0=deactivated)		0
13	input, clear counters (0=deactivated/1=activated)		1
14	output, clear counters (0=deactivated/1=activated)		1
19	inhibit distance, jam detector [mm]		100

Masking of input signals (XRL-masks)

			Default value
1	Inputs 8 - 1		00000010
2	Inputs 16 - 9		00000000
3	Inputs 24 - 17		10000111
4	Inputs 32 - 25		00000001

Masking of output signals (XRL-masks)

1	Outputs 8 - 1		00000000
2	Outputs 16 - 9		00000000
3	Outputs 24 - 17		10101111
4	Outputs 32 - 25		00000000

Definition of container parameters

1	Copy parameters to the current program		1 01
2	Mask of used programs 8 - 1 (0=vacant, 1=used)		00000001
3	Mask of used programs 16 - 9 (0=vacant, 1=used)		00000000
4	Brands, external check (0=manual, 1=external)		00000000

Detection parameters	***basic* VF**	**Program number**
V2.0		**Part 1**
Customer:	Device number:	Date:

General container parameters

No.	Parameter	Value	**Default value**
1	neck diameter [mm]		30
2	body diameter [mm]		60

Parameters of the residual liquid detection

No.	Parameter	Value	Default value
4	length of measuring window, residual liquid [mm]		20
5	limit value for residual liquid Gamma/HF		848 / 100
6	last measured value, residual liquid detection		
10	minimum frequency for bridge residual liquid		
11	maximum frequency for bridge residual liquid		
12	current frequency for bridge residual liquid		
14	gap value reference rate for bridge residual liquid Gamma		100
15	automatic shutter control (0=deactivated/1=activated)		0
16	gap for automatic shutter control [mm]		300

Parameters of the closure detection

No.	Parameter	Value	Default value
1	length of measuring window, closure presence [mm]		20
2	pulse evaluation (0=bad/1=good)		1
3	lower limit for number of pulses		1
4	upper limit for number of pulses		127
5	last measured value		

Parameters of the rejector

No.	Parameter	Value	Default value
1	maximum number of segments		10/16
2	minimum number of segments		5
3	minimum switching speed [mm/s]		300
4	maximum switching speed [mm/s]		1400
5	counter reading of bottom photocell		
6	bottom photocell (0=deactivated/1=activated)		0
7	stand time *mono/pusher* [ms]		25
8	drive time *mono/pusher* [ms]		10
9	display of the reject situation		
10	selection DELTA-FW/DELTA-K (0=deactivated/ 1=FW 10 seg./ 2=FW 10 seg.M/ 3=FW 16 seg./ 4=FW 16 seg.M/ 5=K/ 6=K-M / 7=FW 10 seg. SM/ 8=FW 16 seg. SM / 9=K SM / 10=FW Fast 10 seg. M / 11=FW Fast 10 seg. SM)		0
11	Laning ratio, line 1		3
12	Laning ratio, line 2		3
13	faulty containers remaining on line 1 (0=no / 1=yes)		0
14	pilot control time: valve downwards		23
15	pilot control time: valve upwards		23
16	shifting of the activation		0
17	display of the *flip* status: 0=piston down, 1=piston up		

			Default value
Device status/messages			
6	operating hours counter		
Parameters of the signal acceptance			
1	pulse evaluation (0=bad/1=good)		1
2	pulse type (0=pulse, 1=constant level)		0
3	lower limit for signal length [ms]		30
4/L	counter “signal too early”		
4/R	last measured value, delay [ms]		
5/L	maximum measured value, delay [ms]		
5/R	minimum measured value, delay [ms]		
6/L	counter “signal too long”		
6/R	last measured value, signal length [ms]		
7/L	maximum measured value, signal length [ms]		
7/R	minimum measured value, signal length [ms]		
Detection and reject definitions (0=deactivated, 1=activated)			
5	Residual liquid detection		0
11	closure detection, presence		0
19	Laning, external signal		0
21	Laning, variable		0

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