To help you use Anritsu’s Metal Detectors correctly.

We'll answer your questions.

Anritsu Industrial Solutions is your Best Partner in providing Best Solutions.

ANRITSU INDUSTRIAL SOLUTIONS CO., LTD.

84W167088-02
Daily inspection is very important.

Securing guaranteed detection sensitivity and accurate rejection!

Check the operation at the start of the work day, when changing products and at regular periods.

1. **Checking sensitivity**
   Sensitivity varies with the product temperature*1 and materials, and the ambient temperature.

2. **Checking rejector operation**
   Check that contaminated products are rejected correctly by the rejector.
Check under the most difficult detection conditions.

- Attach the most difficult to detect metal contaminant to a test product and check the rejection. (Usually, check the rejection operation by using the Fe or SUS testpiece.)

- Attach the testpiece to the most difficult to detect position of the product and check the rejection. (The head center is the most difficult to detect position.)

- Sometimes a metal contaminant cannot be detected depending on the shape and orientation of the contaminant. (Remember that not all metals can be detected!)

*See page 14 for a description of detection sensitivity and easy- and difficult-to-detect items.*
Five Basics of Quality Control

1. Manage correctly
   Do not allow inappropriate items to be placed on or near the metal detector.

2. Install correctly
   Install the metal detector and rejector correctly so the upstream and downstream conveyors are not touching them.

3. Clean thoroughly
   To prevent lowered detection sensitivity, clean the conveyor belt and detection head thoroughly each day. Adjust the belt regularly so that there is no mistracking or fraying.

4. Maintain sanitary conditions

5. Use good security
   Manage products to prevent mixing of contaminated and uncontaminated products.
   • Lock the NG products box so that the contaminated products cannot be taken easily.
   • Use a NG products box with sufficient capacity.

   To prevent lowered detection sensitivity, clean the conveyor belt and detection head thoroughly each day. Adjust the belt regularly so that there is no mistracking or fraying.

   Manage products to prevent mixing of contaminated and uncontaminated products.
   • Lock the NG products box so that the contaminated products cannot be taken easily.
   • Use a NG products box with sufficient capacity.
This guide only provides a brief explanation of the metal detector and its operation. For more detailed explanation of the operation procedures, read the Operation Manual.

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A metal detector has an important role in the following applications.

**Product Quality Control**
- Social responsibility—Ensuring consumer safety by preventing contaminated food reaching customers
- Product confidence—Maintaining brand reliability image

**Production Process Control**
- Rejecting contaminated products as early as possible ensures high production efficiency.
- Metal detection guards against damage to production machinery caused by contaminants.

**Supporting Product Liability Law**
- These laws and regulations guard public health and safety by compelling manufacturers to accept responsibility for the safety of their manufactured products.

**HACCP Compatibility**
- This standard sets the rules for inspecting foodstuffs at every stage from production of raw materials until the final products reach consumers to ensure that they are safe, healthy and of sufficiently good quality.
Uses and Applications

Metal detectors play an essential role in contaminant detection in a huge number of fields.

- in food processing lines
- in pharmaceutical manufacturing
- in cosmetics manufacturing
- in garment production lines
Uses and Applications

The special features of metal detectors make them useful in other applications too.

**• Detecting missing soup packet, etc., in instant noodles**

Checking aluminum-foil seals on snacks

Missing components of packaged foods such as foil-packed liquid soup stock or seasonings in instant noodles can be checked. The presence of important metal seals such as clips on sausages can be confirmed.

**• Detecting missing caps and documentation in pharmaceutical products**

The presence of a metal cap or seal and important documentation printed with magnetic ink can be checked.

**• Detecting presence of packed antioxidants**

The presence of metallic antioxidant packs in pre-packaged foods can be checked.
Names of Parts

Photocell (Photosensor)  
- Recognizes presence of product

Indicator  
- Flashes when metal-contaminated product detected

Conveyor belt  

Detection head  

Rejector  
- Rejects metal contaminated products

NG Products box  
- Example of KD80XX Series Operation Panel

- NG Detection display
- Detection level display
- LCD panel
- Conveyor operation display
- Key to change product
- Conveyor Run key
- Menu key
- Conveyor Stop key
- Exit key
- Operation check key
- Cursor/Page switch keys
- Return key
- 1 Recognizes presence of product
- 2 Rejects metal contaminated products
- 3 Flashes when metal-contaminated product detected
**Normal condition**

- Send coil
- Receive coil

**When Fe (magnetic metal) passed through detector**

1. Fe magnetized and magnetic field deflected by Fe
2. Eddy current generated and dissipated as heat energy

**When non-magnetic metal passed through detector**

- Send coil
- Receive coil

Principle of Metal Detection
Contaminant Detection

Detection display

Detection level display

GREEN LED  YELLOW LED  RED LED

Setting start

Setting end

Evaluation level

Operation start

Nth time

Detection signal level

Automatically sets twice setting end level as evaluation level

Evaluates as metal-contaminated product when level exceeds evaluation level

Product feeding
Have you determined the reference sensitivity for each product?

HACCP Requirements (administration principles)
• Administration level for products
• Registration (equipment list, designated administrator, inspection registration, fault history)
• Complete training plan
• Testpiece management

• The sensitivity is adjusted at the Auto-setting screen just by passing the product through the metal detector several times. After attaching the testpiece to the product, check the sensitivity.
• The sensitivity should be adjusted according to the actual conditions (product temperature, ambient temperature, installation location) on the production line.
• Be sure to remove any metal rings, jewelry, wristwatches, etc.

The sensitivity of the testpiece described in the catalog (highest detection sensitivity) is different from the sensitivity at actual product detection (actual sensitivity). The testpiece sensitivity given in the catalog is the sensitivity when only the testpiece is passed through the metal detector.

Registering the sensitivity of each product permits contaminant detection under the optimum conditions.
Sometimes metal contaminants cannot be detected depending on their shape and orientation.

Needle-shaped and cylindrical contaminants can have different detection sensitivities depending on the flow orientation.

Change in Detection Sensitivity with Position at Passage through Head

<table>
<thead>
<tr>
<th>Non-magnetic Metals</th>
<th>Magnetic Metals</th>
</tr>
</thead>
</table>

- Silver
- Copper
- Gold
- Aluminum
- Brass
- Zinc
- Tin
- Lead
- Stainless steel

There are easy- and difficult-to-detect metals.

Magnetic Metals include:
- Steel
- Nickel

Intrinsic resistance:
- Low
- High

Detection sensitivity:
- Easy
- Difficult

Detection Sensitivity of Different Metals

* Side View of Coaxial Type Detection Head
These few small points can help improve detection sensitivity.

- The detection sensitivity is improved by adjusting the conveyor height so that wet products with a large effect, such as miso and pickles, pass through the center of the detection head opening.

Effect of feeding orientation

- Detecting small contaminants in products with a small effect
Effective Operation Methods

Setting Up Line with Even Higher Sensitivity Detection

**Efficient Production Line Flow**

- Production Line
  - Raw materials acceptance
  - Processing
  - Individual packaging
  - Shipping

**Passline height**

- Small
- Large

**Product effect**

- Small
- Large

**Usage example**

- **Metal detector 1**
  - High-sensitivity detection
  - Install downstream of freezer
  - Install upstream of aluminum packager

- **Metal detector 2**
  - Unsuitable for high-sensitivity detection
  - For checking contamination with foreign materials from machinery, such as nuts, bolts, etc.
  - For checking metal contamination by carton itself.

- The metal detector passline height must match the product height.

**Choice of Two Types to Match Application**

1. **Dry Products, Wet Products and Aluminum Evaporated Packages**
   - Dry products like noodles, candies, and clothing
   - Wet products like meat, pickles, pastes, and fish
   - Aluminum-evaporated package products like frozen foods and snacks

2. **Aluminum-foil package product**
   - Aluminum-packaged Retort foods and desserts

- The metal detector is best positioned at the last stage before delivery of the product to the consumer.
To assure correct operation:

- Recheck the installation environment.
- Check that there is no rusting on the belt surfaces.
- Check that the product spacing, orientation and location are constant.
- Check that there are no sudden changes in product and room temperature.
- Check that there are no changes in the components of each production lot.

Changes in detection sensitivity with product components

- Changes in the product water and salt content, weight and thickness change the detection sensitivity.
- Small contaminants can be detected more easily in products with low water and salt content.
- Small contaminants can be detected more easily in products at low temperature. However, surface and internal water have an effect.

Give sufficient consideration to product effect!
Installation Conditions and Usage

Note the following to prevent operation errors:

- Do not install metal detectors near a vibration source.
- Do not share the power outlet with another machine and do not use power strips, etc.
- Do not supply the power via a power cord wound on a drum.
- Check that the feet locknuts are tight to prevent vibration.
- Leave 2 to 5 meters between adjacent metal detectors to prevent electromagnetic interference. If this is not possible, consult Anritsu Industrial Solutions.
- Oversensitive
  - Touching upstream or downstream conveyors or NG product box
- Noise in power line (voltage fluctuation or momentary power loss)
- Electronic equipment close to detection head. Do not put electronic equipment on metal detectors.
- EMI radiated by nearby equipment (especially inverters) or conducted through power line
- Effect of nearby moving metal machinery (rollers and packagers)
- Oversensitive
  - Touching upstream or downstream conveyors or NG product box
**Intrinsic Resistance of Non-magnetic Metals and Detection Sensitivity**

<table>
<thead>
<tr>
<th>Metal</th>
<th>Intrinsic Resistance (μΩ·cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver</td>
<td>1.62</td>
</tr>
<tr>
<td>Copper</td>
<td>1.72</td>
</tr>
<tr>
<td>Gold</td>
<td>2.4</td>
</tr>
<tr>
<td>Aluminum</td>
<td>2.75</td>
</tr>
<tr>
<td>Brass</td>
<td>5~7</td>
</tr>
<tr>
<td>Zinc</td>
<td>6.1</td>
</tr>
<tr>
<td>Tin</td>
<td>11.4</td>
</tr>
<tr>
<td>Lead</td>
<td>21</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>55~</td>
</tr>
</tbody>
</table>

- **High**
- **Low**

**Magnetic Metals**
1. Proportional to volume
2. High sensitivity magnetic directivity
3. Sensitivity to fine powder similar to large lumps
4. Unaffected by send frequency
5. Inversely proportional to square of distance between send and receive coils

**Non-magnetic Metals**
1. Inversely proportional to intrinsic resistance of metal
2. Proportional to maximum radius (area) at right angle to magnetic flux
3. Sensitive only to largest particles of fine powder
4. Proportional to square of send coil frequency
5. Inversely proportional to square of distance between send and receive coils

**Shape of non-magnetic materials and detection sensitivity**

- An eddy current is generated in the large circle at a right angle to the magnetic flux, making it easy to detect.  

  ![Eddy current diagram](image)

- Needle-shaped contaminants in stainless steel, etc., have a small eddy current and are difficult to detect.

**Remarks**

- Differences between Magnetic and Non-magnetic Metals
  - **Simple detection principles**
    - **Detection Sensitivity Characteristics of Magnetic and Non-magnetic Metals**
      - **Magnetic Metals**
        1. Proportional to volume
        2. High sensitivity magnetic directivity
        3. Sensitivity to fine powder similar to large lumps
        4. Unaffected by send frequency
        5. Inversely proportional to square of distance between send and receive coils
      - **Non-magnetic Metals**
        1. Inversely proportional to intrinsic resistance of metal
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        3. Sensitive only to largest particles of fine powder
        4. Proportional to square of send coil frequency
        5. Inversely proportional to square of distance between send and receive coils
Construction of Detector Head

**Relationship between Coil and Magnetic Field**

1. **Coaxial type**
   - A magnetic field is generated when a current flows in the send coil.

2. **Opposing type**
   - A current is generated in the receive coil when it is in a magnetic field.

3. **Permanent magnet type**
   - A current is generated in the receive coil when it is in a magnetic field.

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**Coaxial type**

**Opposing type**

**Permanent magnet type**
FAQ and References

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- Q17 We want to install a metal detector and checkweigher but the space is too small.
- Q18 Can the metal detector detect non-metallic contaminants? ........................... 27
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Q1. How can we best determine the basic sensitivity?
A1. • Check the sensitivity by detecting an Fe and SUS testpiece attached to the product. When the product effect is large, it is necessary to measure the basic sensitivity that takes the product temperature and shape randomness into consideration as well as low basic sensitivity.
• Register the basic sensitivity as shown in the Basic Sensitivity Management Table at the end of this booklet (page 29).

Q2. Can you explain the classification of wet and dry products?
A2. • There is no clear division point but water content is a practical method.
  Dry products are items like snacks foods, candies, wheat flour, and completely frozen items.
  Wet products are items like vegetables, ham, sausage, pickles and raw meats.

Q3. How can we best avoid operation errors caused by floor vibration?
A3. • It is best to install metal detectors in locations with no floor vibration but if this is not possible, use the metal detector with lower basic sensitivity.

Q4. How can we prevent mis-detection of metal contaminants?
A4. • You can reduce the misdetection rate by managing the basic sensitivity for each product and by performing careful operation checks at the daily inspection.
Q5. At shipping inspection we get OK but then at acceptance inspection we get NG!

A5. 
• The basic reason is the difference in detection sensitivity with a larger detection head. The shipper often performs inspection with a large detection head while the buyer splits the delivered product into smaller parts and inspects with a smaller detection head. It is very important to use a metal detector with the smallest possible entrance (opening) matching the size of the product.

Q6. We want to be able to detect lead shot, bullets, and hypodermic needles in lumps of meat!

A6. 
• A block of meat is very wide and thick and detection may not be possible even with a large detection head. In this case, to detect small metal contaminants, it would be best to cut the meat into smaller pieces and then perform detection with a smaller head.

Q7. We want to be able to detect pieces of metal brushes and metal mesh!

A7. 
• It can be very difficult to detect needle like metal contaminants from metal brushes and metal mesh. Even if the pieces are long, if they are very small diameter, they may not be detected (see page 14).
Q8. Why does detection sensitivity change with temperature in frozen products?

A8. Compared to a perfectly frozen product, the effect of water and salt content on detection sensitivity is larger in thawing or defrosted products, so the detection sensitivity is lower.

Q9. Can you detect burned and rusted metals?

A9. Yes. However, the detection sensitivity varies according to the shape and orientation of the contaminant. In addition, very small particles may not be detected.

Q10. Why does the bar graph display continue to move even when products are not being fed through the detector?

A10. A metal detector detects metal contaminants by detecting very small changes in the magnetic field. Consequently, if there are moving metal objects or machinery that generates a strong magnetic field nearby, they may cause changes in the magnetic field and be detected. In addition, a dirty conveyor belt can also cause field fluctuations.

Q11. Can operators wear rings and wristwatches, etc., while working?

A11. Metal rings and wristwatches, etc., can have an effect on magnetic fields and be detected by a metal detector. Operators should remove rings and wristwatches before starting work.
Q12. Can products in transparent bottles be detected?
A12. • In the case of completely transparent bottles, the photocell may miss the product. In this case, consult Anritsu Industrial Solutions for possible solutions.

Q13. What cautions should be noted when feeding bulk products?
A13. • When a rejector is connected, it is necessary to set a sufficient rejector hold time (rejector operation time).
• When the metal detector operation is set to stop at metal detection, remove all the bulk product from the conveyor belt before restarting.

Q14. What is the warm-up time after power-on?
A14. • To ensure accurate detection, the metal detector should be allowed to warm-up for 30 minutes or more after power-on. The metal detector should be reset when the room temperature changes markedly, especially in the morning.
Q15. What precautions are needed at cleaning?

A15. • Any dirt and product particles must be cleaned off frequently from the detector head opening and conveyor belt gaps using a neutral detergent and a soft plastic brush and cloth. Do not use thinners, toluene or metal brushes, etc. In addition, clean the main unit with hot water at less than 40 degrees Centigrade (in accordance with waterproofing specifications).

Soft plastic brush

Metal brush

40° C max.

Neutral detergent

Soft cloth

Q16. We want to keep a record of the detection operation.

A16. • Use the optional printer.

Q17. We want to install a metal detector and checkweigher but the space is too small.

A17. • Anritsu Industrial Solutions also has spacesaving checkweigher models with an integrated metal detector.
Q18.
Can the metal detector detect non-metallic contaminants?

A18.
- No. To detect non-metallic contaminants like bone, shell, stones, glass, etc., you should use Anritsu’s X-ray Inspection System.

Features
- High-sensitivity detection
  Detects metals, bone, shell, stones, glass, etc., at high sensitivity
- Compact size at just 800-mm long
  Can be installed simply without changing existing line structure
- Safe for operators and products
  Low-energy X-rays and leakage countermeasures guarantee absolutely safe operation
- Excellent waterproofing standards and HACCP compatible
  All SUS external construction and conveyor part supporting IP66 standard
  One touch removal and fitting of conveyor belt
- Simple operation at large (10.4") color touch panel
<table>
<thead>
<tr>
<th>Date and Time</th>
<th>Product No./Name</th>
<th>Basic Sensitivity Check</th>
<th>Daily Inspection</th>
<th>Checked by</th>
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<tbody>
<tr>
<td>/ /</td>
<td></td>
<td>Fe</td>
<td>Rejctor operation</td>
<td>Cleaning</td>
</tr>
<tr>
<td>/ /</td>
<td></td>
<td>SUS</td>
<td>Rejctor operation</td>
<td>Cleaning</td>
</tr>
<tr>
<td>/ /</td>
<td></td>
<td>Others</td>
<td>Rejctor operation</td>
<td>Cleaning</td>
</tr>
<tr>
<td>/ /</td>
<td></td>
<td>Fe</td>
<td>Rejctor operation</td>
<td>Cleaning</td>
</tr>
<tr>
<td>/ /</td>
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<td>SUS</td>
<td>Rejctor operation</td>
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<tr>
<td>/ /</td>
<td></td>
<td>Others</td>
<td>Rejctor operation</td>
<td>Cleaning</td>
</tr>
<tr>
<td>/ /</td>
<td></td>
<td>Fe</td>
<td>Rejctor operation</td>
<td>Cleaning</td>
</tr>
<tr>
<td>/ /</td>
<td></td>
<td>SUS</td>
<td>Rejctor operation</td>
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</tr>
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<td>/ /</td>
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<td>Others</td>
<td>Rejctor operation</td>
<td>Cleaning</td>
</tr>
<tr>
<td>/ /</td>
<td></td>
<td>Fe</td>
<td>Rejctor operation</td>
<td>Cleaning</td>
</tr>
<tr>
<td>/ /</td>
<td></td>
<td>SUS</td>
<td>Rejctor operation</td>
<td>Cleaning</td>
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<tr>
<td>/ /</td>
<td></td>
<td>Others</td>
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<td>Cleaning</td>
</tr>
<tr>
<td>/ /</td>
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<td>Fe</td>
<td>Rejctor operation</td>
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</tr>
<tr>
<td>/ /</td>
<td></td>
<td>SUS</td>
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<tr>
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<td></td>
<td>Others</td>
<td>Rejctor operation</td>
<td>Cleaning</td>
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<tr>
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<td></td>
<td>Fe</td>
<td>Rejctor operation</td>
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<tr>
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<td></td>
<td>SUS</td>
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<tr>
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<td>Cleaning</td>
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## Metal Detector Basic Sensitivity Management Table

<table>
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<tr>
<th>Prod No.</th>
<th>Product Name</th>
<th>Product Type (only for KD80X Series)</th>
<th>Basic Sensitivity</th>
<th>Remarks</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>☑ Dry products ☑ Wet products</td>
<td>Fe (mm) SUS (mm)</td>
<td></td>
</tr>
<tr>
<td>01</td>
<td></td>
<td>☑ Aluminum evaporated</td>
<td>☑ Others</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td></td>
<td>☑ Film packaged products</td>
<td>☑ Others</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>☑ Dry products ☑ Wet products</td>
<td>☑ Others</td>
<td></td>
</tr>
<tr>
<td>04</td>
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<td>☑ Aluminum evaporated</td>
<td>☑ Others</td>
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<tr>
<td>05</td>
<td></td>
<td>☑ Film packaged products</td>
<td>☑ Others</td>
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<tr>
<td>06</td>
<td></td>
<td>☑ Dry products ☑ Wet products</td>
<td>☑ Others</td>
<td></td>
</tr>
<tr>
<td>07</td>
<td></td>
<td>☑ Aluminum evaporated</td>
<td>☑ Others</td>
<td></td>
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<tr>
<td>08</td>
<td></td>
<td>☑ Film packaged products</td>
<td>☑ Others</td>
<td></td>
</tr>
<tr>
<td>09</td>
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<td>☑ Dry products ☑ Wet products</td>
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<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>☑ Aluminum evaporated</td>
<td>☑ Others</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>☑ Film packaged products</td>
<td>☑ Others</td>
<td></td>
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<tr>
<td>12</td>
<td></td>
<td>☑ Dry products ☑ Wet products</td>
<td>☑ Others</td>
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<tr>
<td>13</td>
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<td>☑ Aluminum evaporated</td>
<td>☑ Others</td>
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<td>14</td>
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<td>☑ Film packaged products</td>
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<td>☑ Dry products ☑ Wet products</td>
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<td>Item</td>
<td>No.</td>
<td>Inspection Contents</td>
<td>Inspection Frequency</td>
<td>Result</td>
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<td>--------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Installation</td>
<td>1</td>
<td>All screws tight on each part</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No missing screws, damage or deformation to external parts</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>All connectors to Indicator and detection head connected tightly</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>No vibration in detector main unit</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All locknuts on feet tight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Passline secure and no other parts touching</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td>Product Characteristics</td>
<td>5</td>
<td>No change in product characteristics</td>
<td>Every day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(product character, product temperature, size, packaging)</td>
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<tr>
<td></td>
<td>6</td>
<td>Product matches set Prod No.</td>
<td>Every day</td>
<td></td>
</tr>
<tr>
<td>Conveyor Parts</td>
<td>7</td>
<td>Conveyor and drive belt tension correct and no belt slip</td>
<td>Every day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>No conveyor belt mistracking, damage or slippage</td>
<td>Every day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>No abnormal noise from rollers and motors</td>
<td>Every day</td>
<td></td>
</tr>
<tr>
<td>Photocell</td>
<td>10</td>
<td>Photocell surfaces clean</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>No misalignment in photocell axis and accurate product detection</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>No double recognition of single products</td>
<td>6 months</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>No.</th>
<th>Inspection Contents</th>
<th>Inspection Frequency</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator</td>
<td>13</td>
<td>Each key operates correctly</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>No error displays</td>
<td>Any time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>No tripped fuses and breakers and no abnormalities</td>
<td>Any time</td>
<td></td>
</tr>
<tr>
<td>Detector head</td>
<td>16</td>
<td>No abnormalities in rubber packings and mounting bolts</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td>Operating environment</td>
<td>17</td>
<td>No effect from external noise, interference and moving metal objects</td>
<td>Any time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>Correct and stable power supply voltage</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>No operation errors due to vibration and mechanical shock</td>
<td>Any time</td>
<td></td>
</tr>
<tr>
<td>Rejector operation</td>
<td>20</td>
<td>Normal rejector operation</td>
<td>Any time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>Correct rejector operation timing</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td>Detector characteristics</td>
<td>22</td>
<td>No detection of uncontaminated products</td>
<td>Every day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accurate detection of product with testpiece</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>No error when running conveyor belt with no products</td>
<td>Any time</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean conveyor belt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>Products fed at consistent interval and orientation on conveyor belt</td>
<td>Any time</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

Inspector
The main terms used in this brochure are explained below:

<table>
<thead>
<tr>
<th><strong>Magnet</strong></th>
<th>A mineral with magnetic properties having north and south poles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Magnetic Force</strong></td>
<td>Force between the north and south poles of a magnet. Like poles repel while opposite poles attract</td>
</tr>
<tr>
<td><strong>Lines of magnetic force</strong></td>
<td>The lines of magnetic force around the poles of a magnet</td>
</tr>
<tr>
<td><strong>Magnetic field</strong></td>
<td>The force field generated around a magnet or current</td>
</tr>
<tr>
<td><strong>Magnetism</strong></td>
<td>The quality possessed by magnetic materials or the quality induced in a magnetic field</td>
</tr>
<tr>
<td><strong>Testpiece</strong></td>
<td>A test material used for evaluation (a spherical metal object for testing metal detection by a metal detector) Uses a sphere to evaluate without effect of shape and orientation Either strongly magnetic metal like Fe, or non-magnetic metal like SUS</td>
</tr>
<tr>
<td><strong>Coil</strong></td>
<td>When current passed through winding on metal core, generates magnetic field in concentric circles around winding</td>
</tr>
<tr>
<td><strong>Detection sensitivity</strong></td>
<td>The minimum diameter (mm) of a metallic object that can be reliably detected by a metal detector Both Fe and SUS have specific detection sensitivities (SUS = 0.5) The detection sensitivity can be specified as either the sensitivity when a testpiece is attached to the product or when only the testpiece is passed through the detector. In the former case, the value varies each time a test product is inspected. In the latter, the value is constant and depends only on the metal detector.</td>
</tr>
</tbody>
</table>
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