Features

- A 20μm pinhole can be detected reliably on the 1.500 m/min high-speed line.
- Detection sensitivity stays unchanged against the line speed variation.
- Variation of detection sensitivity in the sheet width direction is very small as a pinhole is detected using the optical fiber bundle.
- It can respond to up to 10-times diameter change thanks to the wide dynamic range.
- Possible to print out inspection data, to save data and to connect with host computer for central control.
- Equipped with database function.

Overview

- TH-1400PC optically detects a pinhole on an opaque sheet-like material such as aluminum foil, copper foil, copper sheet, or steel sheet with a high degree of accuracy using a fluorescent lamp, an optical fiber and a photomultiplier.
- The faint fluorescent light from a pinhole of sheet material passes through an optical fiber and then detected by a highly sensitive photomultiplier.
- Possible to detect a 20μm pinhole reliably.
- Pinholes are variously classified according to size, density, continuity of pinhole distribution, appearance periodicity, and elongate pinhole length.
- Model TH-1400PCA has the automatic edge tracing mechanism, thereby a stable detection is achieved even if a sheet material yaws.

Applications

Pinhole detection of:
- Aluminum foil
- Copper foil
- Steel sheet
- Rubber sheet
- Other various opaque sheets

Models

<table>
<thead>
<tr>
<th>Model Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH-1400PCH</td>
<td>Manual operation type</td>
</tr>
<tr>
<td>TH-1400PCA</td>
<td>Automatic tracing type</td>
</tr>
</tbody>
</table>

Detection principle

Dead zone at edge parts

- Dead zone is 10mm at both edges in small snaking sheet.
- Apply edge mask automatic tracing mechanism equipped type when snaking is more than ±5mm.
1. A little light coming through a pinhole on the sheet is conducted to the photomultiplier tube through optical fiber.
2. This little light is converted into an electrical signal and amplified by the photomultiplier.
3. The amplified electrical signal is processed in various ways and a relay contact signal is output after sorting a pinhole by size.
4. It is possible to connect a printer at the user’s option.

**Configuration chart of device**

- **Light source**
- **Light receiver**
- **Inverter**
- **Controller**
- **Printer**
- **Keyboard or setting panel**

**Pinhole detector** is composed of light source obtained high frequency lighted (DC lighted) fluorescent lamp by inverter, optical fiber type light receiver that receives slight light passed through pinhole, and controller that outputs as contact or voltage signal after processing pinhole signal electrically.

- This electric signal is used for following type judgment.
  - Size (large, middle, and small) judgment
  - Density judgment
  - Continuity judgment
  - Reed like pinhole detection
- Followings are processing executed by pinhole signal mentioned above.
  - Printing out
  - Individual data saving
  - Central concentrated control by connecting with host computer
  - Processing such as issuing of relay contact signal when criteria are achieved.
- Also printer can print out data of pinhole mentioned above when optional printer is connected.

**Various characteristics**

- **Flat characteristic**

**Linearity (Output voltage for pinhole diameter)**

- Measured example at static state

- Saturation level

- CH-1 Measured at position 100mm away from center of light receiver

- Output Voltage (V)

- Pinhole diameter (μm)

- Resolution

- Resolution of flow direction
  - Pinhole can be separated when distance between holes is more than about 10mm. However this resolution capability is excluded when pinhole more than 200μm is detected and control output is timer.

- Resolution of width direction
  - Resolution of width direction is equal to the size of pinhole. However pinhole cannot be separated and judged to be one hole and pinhole signal is indicated larger when the pinholes are present on the same line of fiber.
Line speed – Output voltage characteristic

Inspection start signal
Detection operation is started receiving inspection start signal from line at the time sheet flowing started. Please provide “A-contact” or “Open collector signal” as shown in below figure.

Automatic edge tracing mechanism
We recommend applying of edge mask automatic tracing mechanism equipped type (TH -1400A) when sheet is snaked more than ±5mm. Sheet is inspected keeping dead zone at edge parts within 8mm even sheet is snaked because the detector automatically can trace edge mask by servo motor.

Specifications

<table>
<thead>
<tr>
<th>Basic performance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection object</td>
<td>Opaque sheet</td>
</tr>
<tr>
<td>Inspection width</td>
<td>500 - 1,380mm</td>
</tr>
<tr>
<td>Thickness of object</td>
<td>1.2mm or less</td>
</tr>
<tr>
<td>Line speed</td>
<td>Max. 1,500m/min</td>
</tr>
<tr>
<td>Acceptable pitch</td>
<td>±1mm</td>
</tr>
<tr>
<td>Acceptable yaw</td>
<td>±2mm</td>
</tr>
<tr>
<td>Inspection area</td>
<td>Whole area of sheet excluding 10mm dead zone at both edges</td>
</tr>
<tr>
<td>Detection performance</td>
<td>A pinhole 20µm in diameter or larger</td>
</tr>
</tbody>
</table>

| Light source              | Light system            | High frequency fluorescent lamp (20kHz – 30kHz, white) |
|                          | Power supply            | Supplied from inverter |
|                          | Setting distance        | Distance to object: 40mm |

| Light Receiver            | Light collection system | Light collection by optical fiber |
|                          | Photoelectric transducer | Photomultiplier tube |
|                          | Setting distance        | Distance to object: 1.5~2mm |

| Controller                | Output                  | 1. Relay output (a-contact) |
|                          |                         | • Detection output (timer output) |
|                          |                         | • ON time: 0.5sec±30% |
|                          |                         | • Sheet absence alarm |
|                          |                         | 2. Electronic buzzer alarm (timer output) |
|                          |                         | • Operating time: About 1 sec |
|                          |                         | (with ON/OFF switch) |
|                          | Operation power source  | AC100V±10% 50/60Hz |
|                          | Power consumption       | Approx. 300VA |

| Automatic edge tracing mechanism (TH-1400PCA) | Moving speed | 4mm/sec or less |
|                                               | Open-close range | 400-1,400mm |
|                                               | Setting accuracy | ±1 mm |
|                                               | Drive source      | Servomotor |
|                                               | Control system    | Sequencer control |
|                                               | Outline dimension | 800 (W) × 700 (H) × 250 (D)(mm) |
Outline dimension drawing

Light source and receiver setting drawing (Manual type)

- Inspecting sheet
- Cable connector
- Edge mask driving handle

Light source
Edge mask
Pass line

1830
100
250

Controller (TH-1400PC)

Edge tracing panel

1180
100
250

Light source and receiver setting drawing (Automatic tracing type)

- Inspecting sheet
- Cable connector

Light source
Edge mask
Pass line

1900
100
250

TAKENAKA SYSTEM CO., LTD.

Headoffice: 86-66, Nomizo-cho, Ohtsuka, Yamashina-ku, Kyoto City 607-8135, JAPAN
TEL: +81-75-593-9300  FAX: +81-75-593-9790  E-mail: sales@takex-system.co.jp
TAKENAKA SYSTEM URL: http://www.takex-system.co.jp
TAKENAKA SENSOR GROUP URL: http://www.takex.co.jp

* The contents of this catalog is based on the data of April 2016. CAT 20160405

* It may be changed without a notice about all items (product name, a model, specifications, external form dimensions, materials, the price) explained by this catalogue.
* We do not take responsibility about any accident damage by an error in the use of deficiency in the construction and deficiency of the maintenance check and this product, the natural disaster (surge, including lightning-induced).