

PINHOLE DETECTOR

TH-1400

Optical fiber type which is detectable pinhole as small as diameter 20 μm .



Model

TH-1400H	Edge mask manual operation type
Light source	TH-65FA
Receiver	TH-1400HR
Controller	TH-1400C

TH-1400A	Edge mask automatic tracing type
Light source	TH-65FA
Receiver	TH-1400AR
Controller	TH-1400C

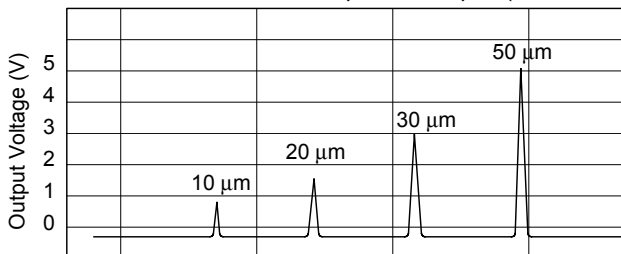
Application

Pinhole detection of :

- Aluminum foil
- Copper foil
- Steel sheet
- Rubber sheet
- Other various opaque sheets

Detection signal waveform

Detection waveform for $\phi 10 \mu\text{m}$ - $\phi 50 \mu\text{m}$ (at 500m/min)



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.

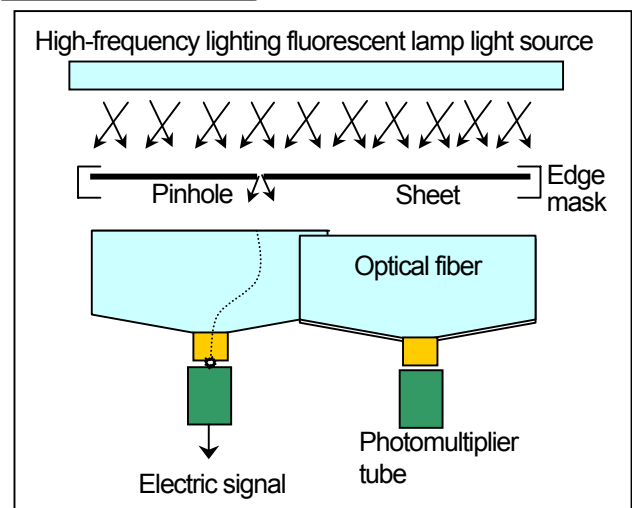
Outline

- This pinhole detector optically detects pinhole appeared on opaque sheet substance made of such material as aluminum foil, copper foil, copper sheet, and steel sheet using fluorescent lamp and optical fiber in good accuracy.
- Slight ray of fluorescent lamp light leaked from pinhole of sheet material is passed through optical fiber and detected by high sensitive photomultiplier tube.
- Pinhole of diameter 20 μm can be detected surely.
- Automatic edge tracing mechanism is equipped in TH-1400A type, therefore stabled detection is possible even sheet is snaked.

Features

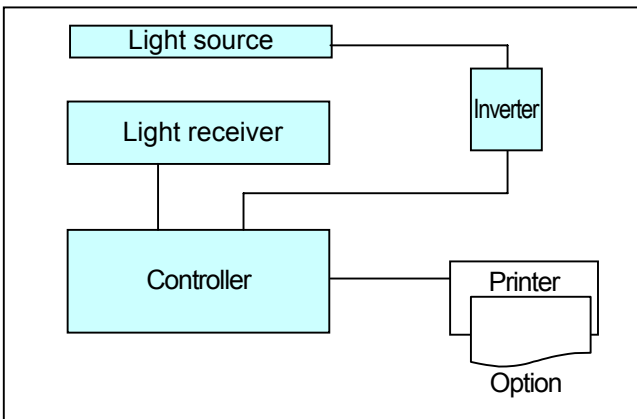
- Pinhole of diameter 20 μm is surely detected in high speed line of 1,500m/min.
- Detection sensitivity is not changed even line speed is changed.
- Variation of detection sensitivity in sheet width direction is very small because pinhole is detected using optical fiber.
- Dynamic range is very wide, therefore the device can respond to ten times diameter variation.

Detection principle



1. Slight ray fluorescent lamp light leaked from pinhole of sheet is led to photomultiplier tube through optical fiber.
2. This slight light is amplified and converted into electric signal by photomultiplier tube and outputted
3. This electric signal is processed in various ways and relay contact signal is outputted judging size of pinhole.
4. Connection to printer is also possible by option.

Configuration chart of device



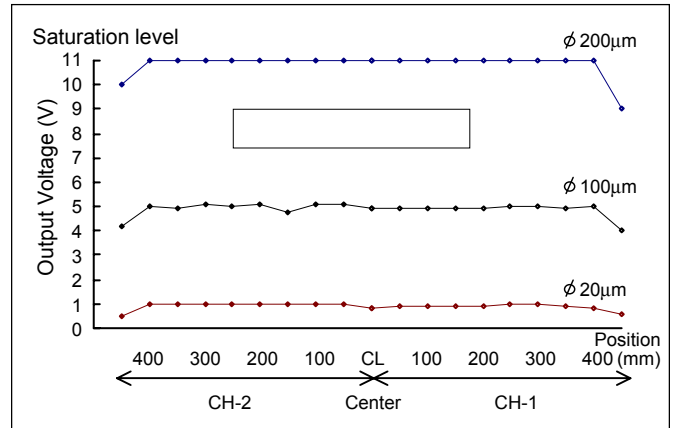
- Pinhole detector is composed of light source obtained high frequency lighted (DC lighted) fluorescent lamp by inverter, optical fiber type light receiver that receives slight light passed through pinhole, and controller that outputs as contact or voltage signal after processing pinhole signal electrically.
- Size of pinhole is judged and signals are outputted respectively.
- Also printer can print out position of pinhole flow direction when optional printer is connected.

Resolution

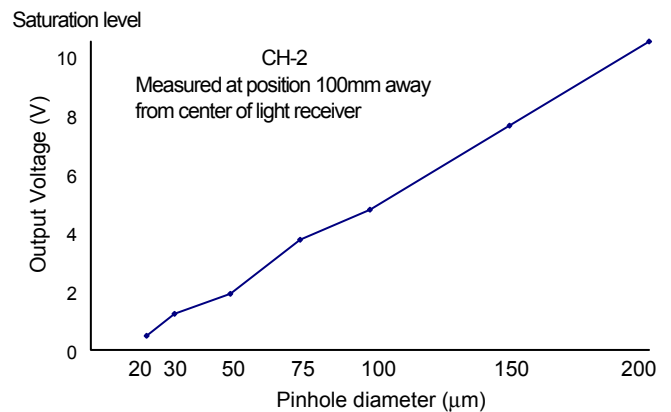
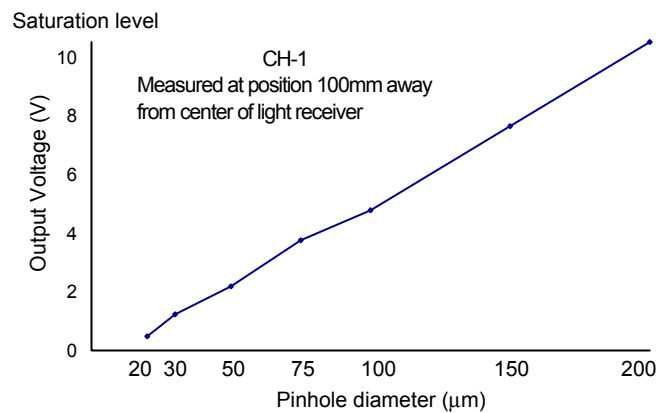
- Resolution of flow direction
Pinhole can be separated when distance between holes is more than about 10mm. However this resolution capability is excluded when pinhole more than 200 μm is detected and control output is timer.
- Resolution of width direction
Resolution of width direction is equal to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

Various characteristics

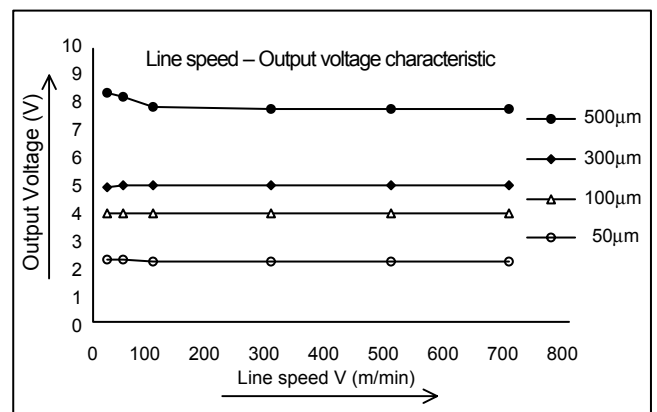
- Flat characteristic



- Linearity (Output voltage for pinhole diameter)
Measured example at static state



- Line speed – Output voltage characteristic (Example)

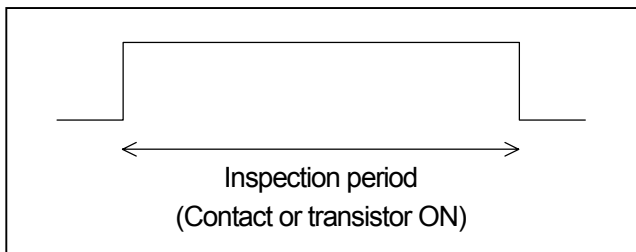


Control

- Size judgment
 Detection signal is outputted judging into large and small.
 Numeral value of size (large and small) can be set using digital switch.
 Also setting range is 10 times of standard pinhole diameter.
 Output signal
 Electronic buzzer issues alarm signal together with issuing of contact signal when pinhole is detected.

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

Inspection accuracy / Objected substance	
Type	Opaque sheet state substance
Width	500 - 1,380mm
Thickness	Less than 1.2mm
Driving speed	Max. 1,500m/min
Vertical vibration	Less than ±1mm
Snaking	Less than ±2mm
Ambient temperature	0°C - +40°C
Line state	Continuous
Inspection area	Whole area of sheet excluding 10mm dead zone at both edges
Inspection accuracy	More than $\phi 20 \mu\text{m}$ pinhole diameter

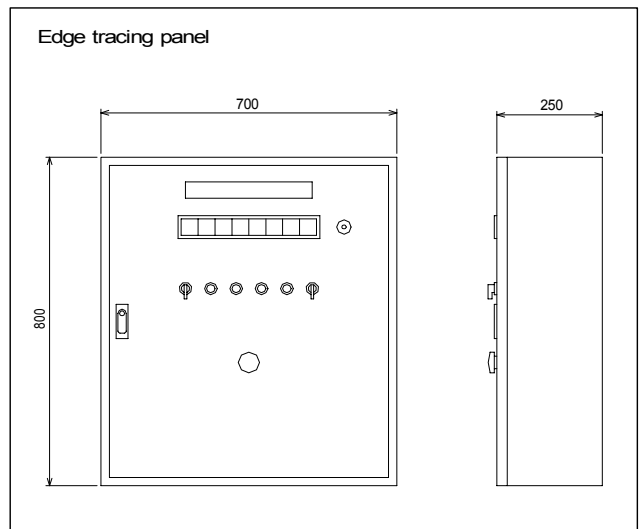
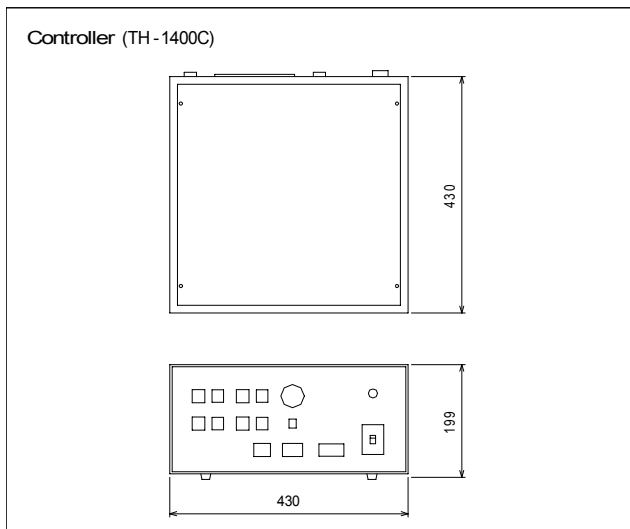
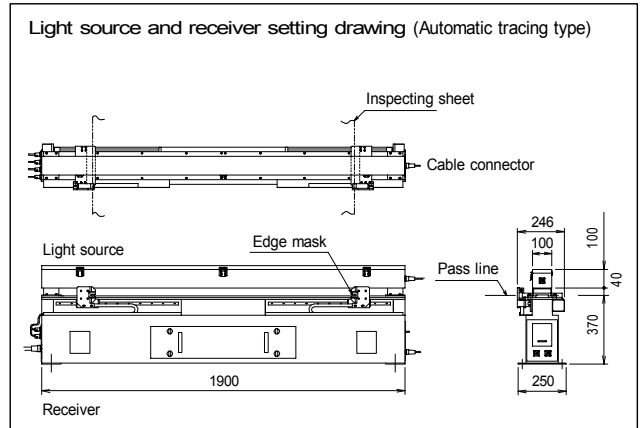
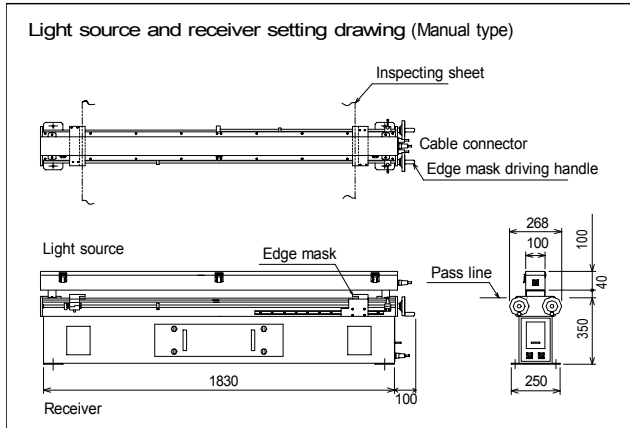
Light source	
Light projecting method	High frequency lighting method (20KHz - 30KHz)
Light source	White fluorescent lamp
Operation power source	Supplied from inverter
Connection method	Metal plug socket type
Setting distance	Distance from objected substance 40mm
Operating temperature	0°C - +40°C (Shall be free from dew condensation.)

Receiver	
Light receiving method	Optical fiber light collecting method
Photoelectric transducer	Photomultiplier tube
Light receiving width range	Various types
Setting distance	Distance from objected substance 2mm
Operating temperature	0°C - +40°C (Shall be free from dew condensation.)

Controller	
Judgment criteria setting	Setting of slice voltage (Judgment criteria) by digital switch. Setting range is ten times of standard pinhole diameter.
Synchronizing	Customer supplied inspection command (ON period of "A-contact" or "Open collector signal" becomes inspection period.)
Display	<ul style="list-style-type: none"> • Power display: LED (amber) • Detection display: LED (red) • Sheet breakage display: LED (orange) • Inspecting display: LED (green) • Display of total turning on time of electricity using hour meter
Output	<ol style="list-style-type: none"> 1. Relay output (A-contact) <ul style="list-style-type: none"> • Detection output (timer output) ON time: 0.5sec 30% • Alarm output for sheet breakage (timer output) Operation time: About 1 sec (with ON and OFF switch) 2. Electronic buzzer alarm
Operation power source	AC100V ±10% 50/60Hz
Power consumption	About 300VA
Connection method	Metal plug socket and terminal block type
Operating temperature	0°C - +40°C (Shall be free from dew condensation.)

Edge mask automatic tracing system	
Moving speed	Less than 4mm/sec
Open and close range	400 - 1,400mm
Setting accuracy	Within ± 1 mm
Operation panel	Control by sequencer
Operating temperature	0°C - +40°C
Outline Dimension (mm)	800(H) × 700(W) × 250(D)

Outline dimension drawing (mm)



Please understand that contents are subject to change without previous notice due to improvement of specifications.



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