

Translucent Hole Detection System

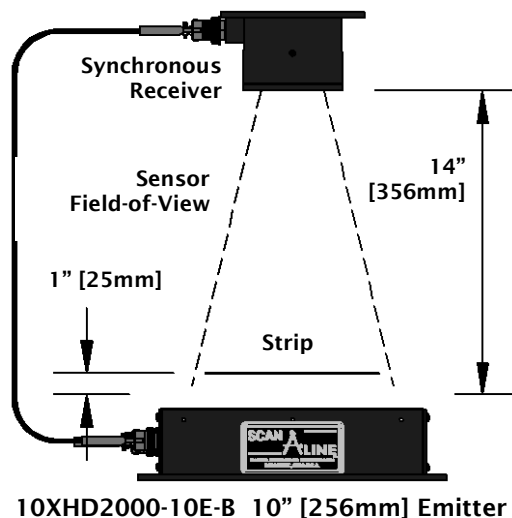
Overview

The SCAN-A-LINE™ Translucent Hole Detection system (THD System) provides reliable inspection of translucent materials with optical density and color. Many strip and sheet products require the use of adhesive coatings. A hole in the base material can pose serious quality and production problems.

The Model 10XHD2000-Series Hole Detector sensors utilizes Harris Instrument Corporation's patented Scanned-LED Technology. Combined with a 200kHz. sample rate, the Model 10XHD2000-Series sensor can readily detect holes down to 0.120" [3mm] in materials that have a 30% or more optical density. Integrated with an advanced synchronous detector, the Model 10XHD-2000-Series provides reliable hole detection with extraordinary rejection of ambient light interference.

Hole defects can be detected to within 1.0" [25.4mm]* of the strip edges without the use of mechanical shutters. Operation without moving mechanical shutters eliminates the need for most mechanical maintenance. The sensor system operates by edge counting to overcome difficulties with changing web positions and irregular strip widths.

The Translucent Hole Detection System (THD System) provides relay outputs and indicator lamps on the Model HDPC for the hole detection and FAIL-SAFE. The time that the indicator lamp remains lit and the relay contact stays closed is 1 second to permit a PLC or host computer time to see the signal. The Model HDPC supplies regulated power and full signal processing for single sensor or dual SCAN-A-LINE™ Model 10XHD2000-Series sensors of the same type and size. A fail-safe circuit will monitor the sensor power circuits and scan rate. An indicator lamp and relay contact closure signal normal system operation. This prevents missed holes due to cut cables, sensor damage, power loss or other system malfunctions.



10XHD2000-10E-B 10" [256mm] Emitter



10XHD-2000 Sensor Set



Model HDPC
Hole Detection
Processing
Computer

Features

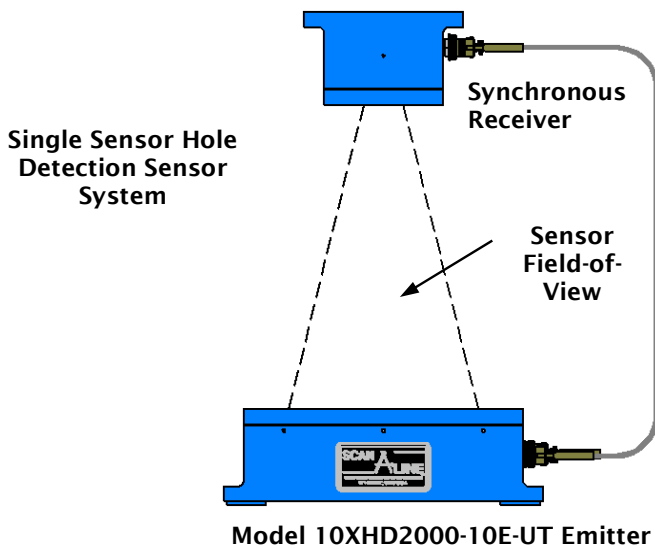
- ² Detect holes in translucent materials down to 0.120" [3mm]
- High speed scanning at 2,000 scans per second
- Hole Detect event logging sent via RS-232 or RS-485 detailing, Hole event, Hole count, Sensor name, Emitter position and Footage
- Automatic trigger level adjustment for color and density variation
- Analog Output:
 - +/- 10VDC output provides a centerline when used with two sensors (Sensor A and Sensor B). Analog Resolution is 0.250" [6.3mm]
 - 0 - 10VDC output provides edge position when used with one sensor (Sensor A). Analog Resolution is 0.250" [6.3mm]
- Automatic Operational Modes:
 - Detects one or more holes with emitter completely covered by the strip
 - Detects one or more holes with one edge of emitter not covered by the strip
 - Detects one or more holes with both edges of emitter uncovered by the strip
- Detect holes within 1.0" (25.4mm)¹ of the strip edge
- Sensors available in 10", 20", 30", & 40" length
- Balanced LED intensity for uniform inspection sensitivity
- Exceptional Ambient Light tolerance due to 200kHz light modulation frequency
- Quad Relay Extender (*Optional) : Enables relay closure time to be extended up to 10 seconds

Description

The 10XHD2000-Series Sensor sets consist of a Scanned-LED Emitter and a Synchronous Detector Receiver. A 15' [4.4 m] cable is supplied for connecting the receiver to the emitter and a 20' [6.1 m] cable is provided for connecting the emitter to the Hole Detection Processing Computer – Model HDPC. Emitters are supplied in four lengths, 10" [254 mm], 20" [508 mm], 30" [762 mm], and 40" [1016mm]. The Model 10XHD-2000-10 emitter has a scan time of 0.5 milliseconds. Since the LED IR source scans at 2,000"/sec, longer emitters require greater scan times and in some cases multiple short emitters may be required to achieve required system performance on higher speed lines or lines with thicker materials.

The emitters are housed in an extruded aluminum enclosure with a Lexan™ polycarbonate window. In normal operation, the synchronous receiver is placed in a position above the emitter where there is an unobstructed view of all of the emitter LEDs. The optimum separation distance for the emitter and receiver varies with the emitter size as shown in the following table. The optimum product to emitter spacing (product passline), however, is fixed at 1" [25mm]. Passline changes will effect minimum hole size and other performance variables.

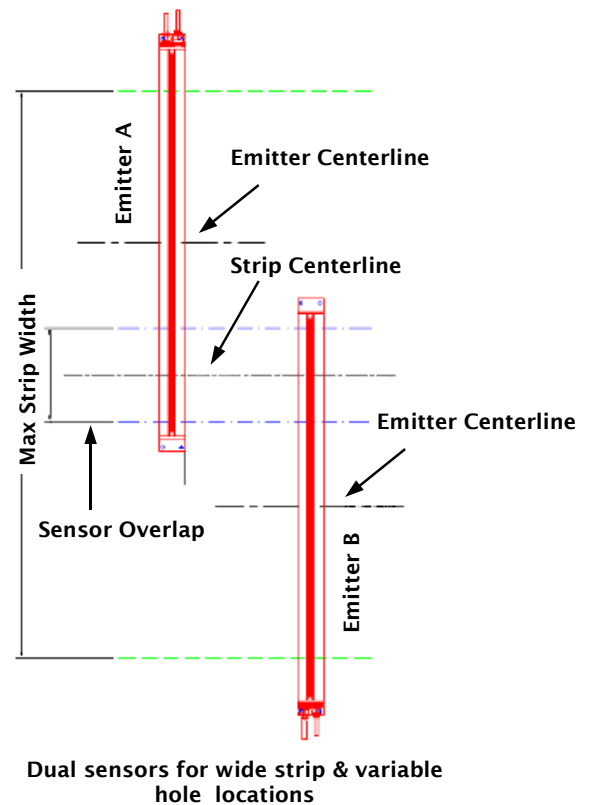
Sensor Model/Size	Emitter Scan Time in Seconds	Emitter Scans Per Second	Emitter-to-Receiver Separation
10XHD2000-10E-B / 10"	0.5ms	2000	20" [356mm]
10XHD2000-20E-B / 20"	1ms	1000	30" [610mm]
10XHD2000-30E-B / 30"	1.5ms	666	40" [864mm]
10XHD2000-40E-B / 40"	2ms	500	50" [864mm]



Operation

The 10XHD2000-Series Sensors use Harris Instrument Corporation's patented Scanned-LED technology to detect holes by counting product edges. This unique approach permits the inspection of web materials without the use of mechanical shutters or movable blinders, often necessary with other hole detector systems. As each scan begins, a sync pulse is used to reset the edge counters in the HDPC Detection Processing Computer.

When a strip is passing over the center of the Emitter, and leaves the LEDs on both ends un-obstructed, only two edges will be detected. If more than two edges are detected, The Model HDPC will alarm for the presence of the holes. When a wider web must be inspected, up to two 10XHD2000-Series sensors of the same size and type can be used to cover the complete width. In this configuration, the Model HDPC will automatically determine the operating mode and will alarm for more than one edge or any edges when the entire Emitter is covered.



¹ Line Speed in Feet per Minute.
² Small hole sensitivity can be degraded at the ends of the scan by the thickness of the material. As the inspected product thickness increases, the minimum detectable hole size increases.
³ Shown for reference only. Line speeds faster than 1000'/min must be verified by Harris Instrument Corporation.

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