

nexen®

WEB CONTROL PRODUCTS

User Manual



Paper Checker PC210

In accordance with Nexen's established policy of constant product improvement, the specifications contained in this manual are subject to change without notice. Technical data listed in this manual are based on the latest information available at the time of printing and are also subject to change without notice.

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DANGER

Read this manual carefully before installation and operation.

Follow Nexen's instructions and integrate this unit into your system with care.

This unit should be installed, operated and maintained by qualified personnel ONLY.

Improper installation can damage your system or cause injury or death.

Comply with all applicable codes.

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ISO 9001 Certified

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THEORY OF OPERATION

Nexen's PC210 Paper Checker system is used on web-fed machinery to detect web breaks or splices. On sheet-fed presses or bag machines, the Paper Checker is used to detect double sheet-feeding.

The Paper Checker system is composed of two parts: the PC210 Paper Checker Control and UH200 Sensor.

The PC210 provides the excitation signal to the Sensor and reads the return signal. The PC210 also indicates machine feed conditions through LEDs located on the

front panel and contact closures. There are two sets of contacts, one for overfeed or splice and one for break.

The Sensor is an ultrasonic sensor composed of a sender and receiver. Each unit is provided with a mounting bracket and 16 Ft. [5 m] of cable to interface with the PC210. The ultrasonic signal allows the Sensor to see through clear and opaque film, paper, foil, and laminates, without false triggering caused by patterns or print on the web.

INSTALLATION

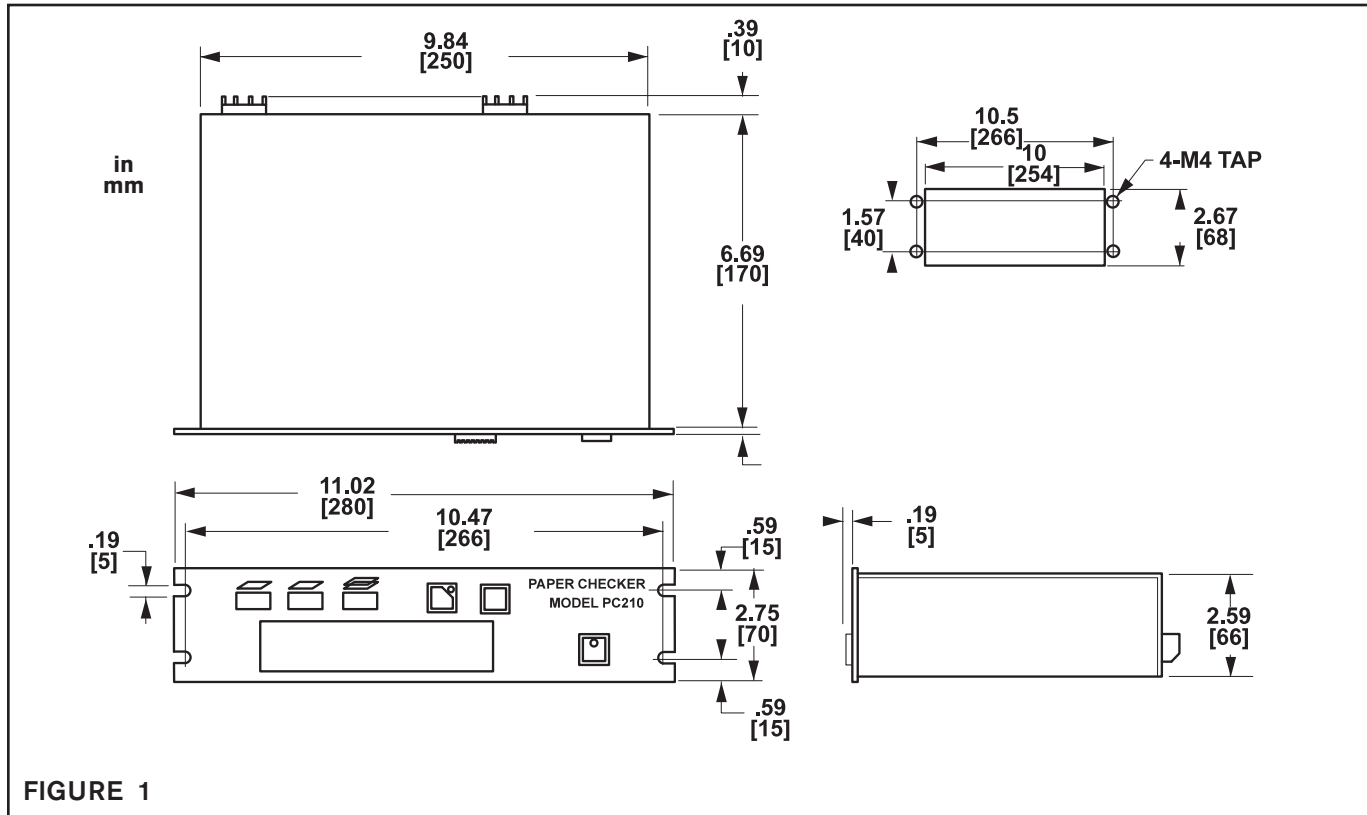


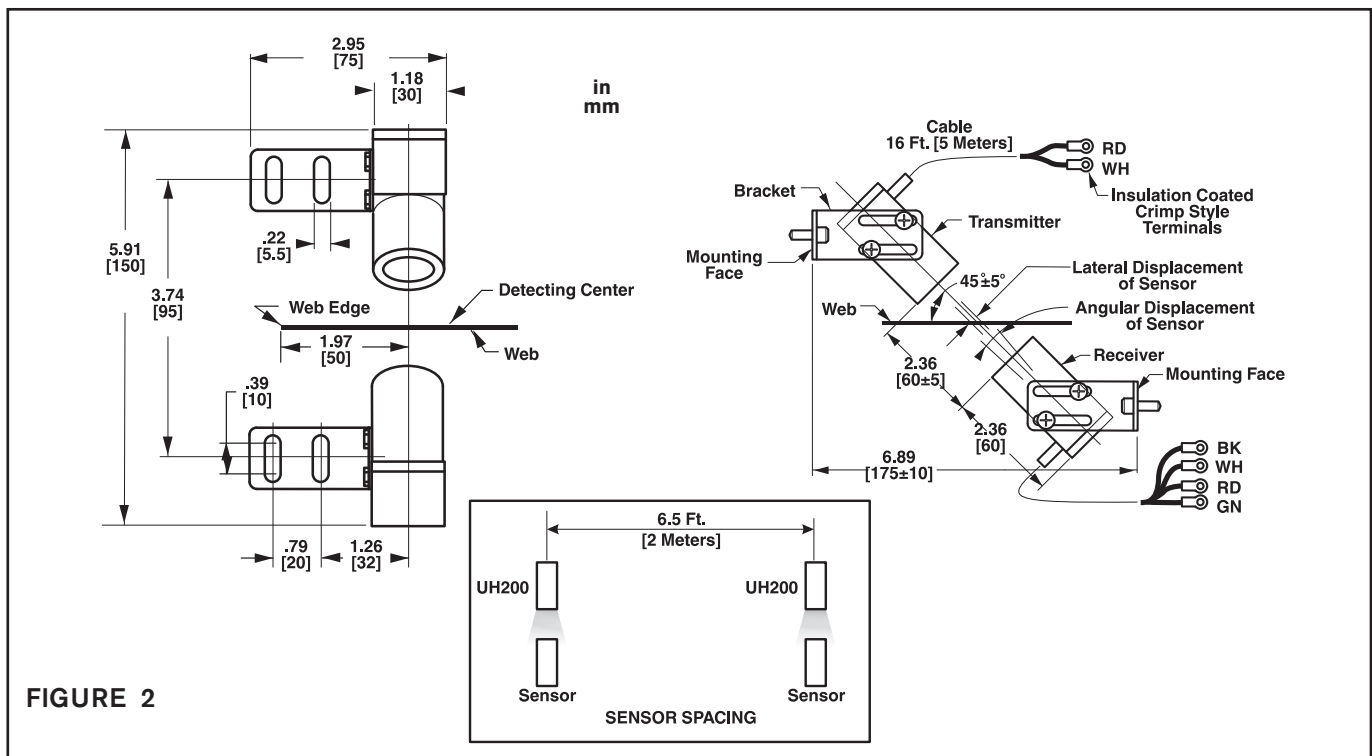
FIGURE 1

The PC210 Controller can be panel or shelf mounted in any location suitable for electronic controls. Locations for electronic controls must be free of shock, vibrations, high temperatures, and moisture.

The sending and receiving elements of the Sensor are provided with a 16 Ft. [5 m] cable to interface with the PC210.

NOTE: The PC210 must be mounted within the cable length of the Sensor. The cable length must not be increased.

(continued...)



NOTE: Sensor placement is dependent on the application, whether web or sheet-fed type machines.

SENSORS

The PC210 utilizes the UH200 sensor pair (finished in black). The sensor model is selected with a switch located on the PC210 Setup Control inside the Cover Panel.

The UH200 sensor operates at a frequency of 40kHz. If two sets of sensors of the same frequency are placed close together there is a possibility of interference of

the signals. To prevent this interference or crosstalk, the sensors must be placed at least 80 in. [2m] apart. In no event may the sensors be placed closer than 8 in. [20 cm].

WEB FED MACHINES

The Sensor must be installed where the web pass line is stable and does not change. If possible, position the Sensor between two closely spaced rolls on a vertical web run. The Sensor must be set at least 2 in. [50 mm] in from the edge of the web.

NOTE: If several different web widths will run on the machine the Sensor must be mounted where it will not have to be moved when the web width is changed.

SHEET-FED MACHINES

Place the Sensor a minimum of 2 in. [50mm] in from the edge of the sheet. The Sensor must be placed in an area of the machine where the sheets are stable as they pass through the Sensor beam.

(continued...)

INSTALLATION (continued...)

ALIGNMENT (SEE FIGURE 2)

2.36 ± 0.20 in. [60 ± 5 mm].

1. The Transmitter must be the upper unit with the Receiver mounted below when used with a horizontal web run.
2. The angle of inclination to the web must be $45^\circ \pm 5^\circ$.
3. The Transmitter to Receiver gap must be
4. The lateral displacement must be within 0.20 in. [5 mm].
5. The angular displacement must be within $\pm 3^\circ$.

ELECTRICAL CONNECTIONS

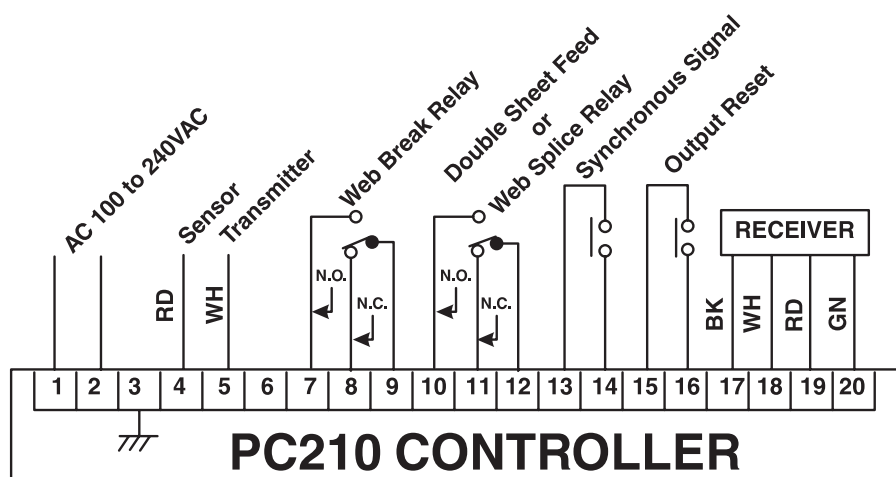


FIGURE 3

1. Provide AC Power 100, 110, 120, 200, 220, 240VAC, 50 or 60 Hz at Terminals 1 and 2. Connect the ground wire to Terminal 3 (See Figure 3).
2. Connect the Sensor Transmitter 16 ft. [5 m] cable to Terminals 4 and 5 (See Figure 3).

NOTE: Do not extend this cable length.

3. Terminals 7, 8, and 9 provide the Web Break Relay contact signal. Wire as appropriate for Normally Open (N.O.) or Normally Closed (N.C.) logic (See Figure 3).
4. Terminals 10, 11, and 12 provide the double sheet-feed (two sheets stacked on top of each other) contact signal for sheet-fed machines or the splice contact signal for web-fed machines. Make electrical connections as appropriate for N.O. or N.C. logic (See Figure 3).
5. A relay may be connected to Terminals 13 and 14 to prevent triggering of either the Web Break or

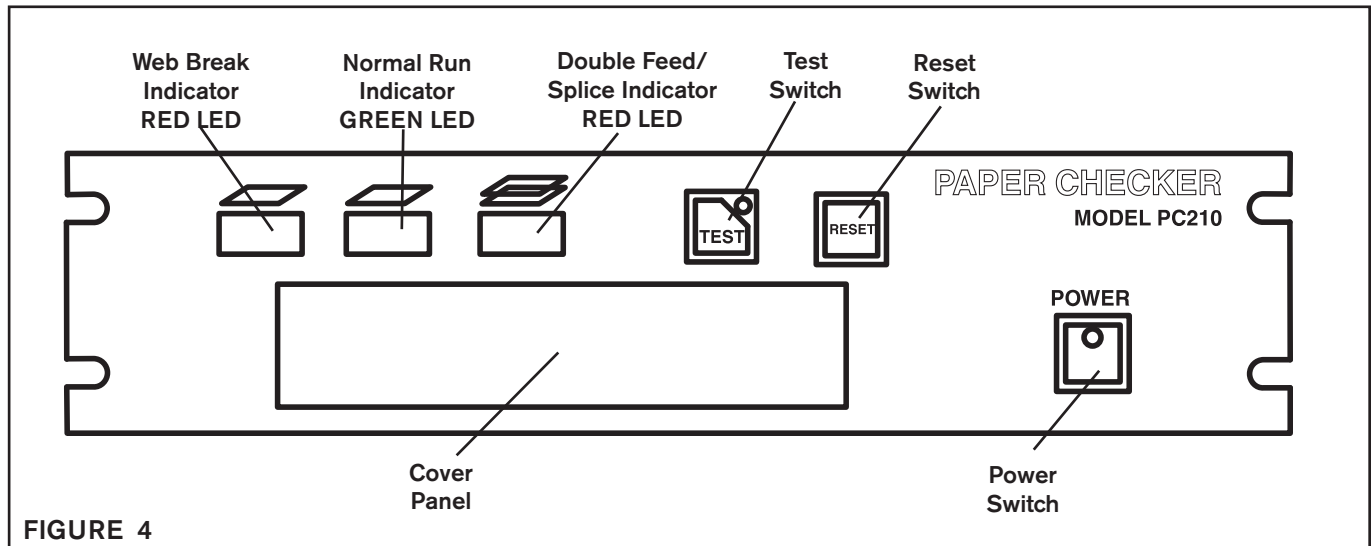
Double Sheet Feed/Web Splice condition. The relay must be a normally open type which closes when triggering is to be prevented.

This Lock Out Relay is normally used to prevent false triggering when the web or sheets stop moving as the machine is stopped. As the web or sheets stop moving they often change position (sag, relax tension, etc.) which causes false triggering.

6. A remote button can be used to reset the system after a double feed or splice signal, when the machine is in manual reset mode. If this option is used, a customer supplied N.O. momentary contact remote Output Reset switch must be connected to Terminals 15 and 16 (See Figure 3).
7. Connect the Sensor Receiver 16 ft. [5 m] cable to Terminals 17, 18, 19, and 20 (See Figure 3).

NOTE: Do not extend this cable length.

FRONT PANEL CONTROLS AND INDICATORS



The **Power Switch** has an imbedded indicator LED that glows when power is on (See Figure 4).

The **Cover Panel** encloses setup controls (See Figure 4).

The **Web Break Indicator** is a red LED that glows under the symbol of a dashed line drawing of a sheet of paper. This LED glows when there is a web break, and the relay at Terminals **7**, **8**, and **9** changes state (See Figure 4).

The **Normal Run Indicator** is a green LED that glows under a solid line drawing of a single sheet of paper. This LED glows when a single sheet is being fed in a sheet-fed machine or a single thickness of web is running in a web-fed machine. At this time, the relay at Terminals **7**, **8**, and **9** and the relay at Terminals **10**, **11**, and **12** are in their normal state (See Figure 4).

The **Double Feed/Splice Indicator** is a red LED that glows under a solid line drawing of two sheets of paper. This LED glows when a double sheet-feed is detected on a sheet-fed machine or when a splice is detected in a

web-fed machine. At this time, the relay at Terminals **10**, **11**, and **12** changes state (See Figure 4).

The **Test Switch** with imbedded indicator LED allows the Sensor to be tested for sensitivity to various materials, thickness, web breaks, etc., without changing state of the relays at Terminals **7**, **8**, and **9** and at **10**, **11**, and **12**. When the Test Switch is depressed and the red LED glows, the PC210 is in test mode. The Web Break, Normal Run, and Double Feed/Splice Indicator LEDs will indicate normally for varying conditions, but the relays will stay in their normal state. This allows for testing without interference with machine logic controls, which read these relay states. When the Test Switch is depressed again, the red LED goes out and the PC210 is back to its normal operation state, with the relays changing state along with the indicator LEDs (See Figure 4).

The **Reset Switch** is used to reset the system after a double feed contact signal in a sheet-fed machine or a splice signal in a web-fed machine is given and the Output Reset Selector Switch (located inside the Cover Panel) is set to manual reset mode (See Figure 4).

SETUP CONTROLS

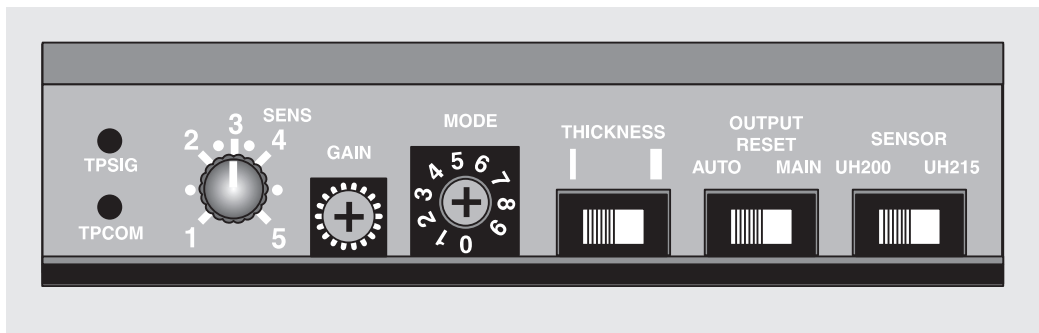


FIGURE 5

NOTE: For machine speed below 30 ft. per minute [10 meters per minute] use Modes 4, 5, and 6.

Setup controls are located inside the cover on the front panel of the PC210. These controls are used to customize the control logic of the PC210 to the individual machine (See Figure 5).

Web Splice Sensitivity Control indicated by "SENS" regulates the sensitivity of the PC210 to splices. Normally set to Position **3**, it has no affect on double feed signals when the machine is in a sheet-fed mode or on web break sensitivity.

Gain Control adjust the level of the signal from the Sensor

Mode Selector Switch indicated by "MODE" programs the logic of PC210 to correspond to the machine-feed conditions. The various positions are described below.

(Mode 0) Not Used

(Modes 1 and 4) Web Splice Only

Used when the only indication wanted is a double thickness splice on a web feed machine. The difference between Modes 1 and 4 is the speed of the machine.

(Modes 2 and 5) Web Splice and Web Break

Used when indication of double thickness (a splice) and absence of web (web break) are needed on a web feed machine. The difference between Modes 2 and 5 is the speed of the machine.

(Mode 3) Used to calibrate the Sensor signal for web splice/double sheet feed when the PC210 is to be used in Modes 1, 2, or 7.

(Mode 6) Used to calibrate the Sensor signal level for web splice/double sheet-feed when the PC210 is to be used in Modes 4 or 5.

(Mode 7) Used when the PC210 is used to detect double sheet feeding in a sheet-fed machine.

Web Thickness Selector Switch sets the standard product thickness to be run. It has two ranges: (LEFT) 0.002- 0.008 in. [0.05-0.20 mm] and (RIGHT) 0.008-0.031 in. [0.20-0.80 mm].

Output Reset Selector Switch determines method of reset after a double sheet-feed or web splice has been indicated. The auto reset relay (switch to the left) automatically resets the PC210 to normal state after a splice or double sheet enters the Sensor. The time delay is adjustable from 0.2-6 seconds (standard factory setting is 2 seconds). The manual reset relay (switch to the right) must be reset to normal state with the Reset Switch on the front panel or by a momentary contact between Terminals **15** and **16**.

Sensor Select Switch The Sensor Select Switch determines which sensor is to be used. UH200 with the switch in the left position, and UH215 with the switch in the right position.

TABLE 1

MODE	FUNCTION	MACHINE SPEED
1	Web Splice Only	30-1000 fpm [10-300 m/min]
2	Web Splice/Web Break	
3	Calibration Mode for Sensor Signal Level	
4	Web Splice Only	Over 1000 fpm [300 m/min]
5	Web Splice and Web Break	
6	Calibration Mode for Sensor Signal Level	
7	Double Sheet-Feed only	1650 fpm [500m/min] max
8-9-0	Not Used	

OPERATION

Detailed operation, setup, testing, and troubleshooting for each mode will be described in this section. Modes 3, 6, 9, and 0 are not operating modes and will be discussed where appropriate within the text.

TABLE 2
OUTPUT CONFIGURATIONS FOR VARIOUS MODES

MODE NO.	WEB BREAK		WEB SPLICE/ DOUBLE SHEET		COMMENTS
	LAMP	RELAY	LAMP	RELAY	
1	NO	NO	YES	YES	Speeds of 30-1000 fpm [10-300 m/min]
2	YES	YES	YES	YES	
3	YES	NO	YES	NO	Sensor calibration Signal for Modes 1, 2, and 7
4	NO	NO	YES	YES	Speeds over 1000 fpm [300 m/min]
5	YES	YES	YES	YES	
6	YES	NO	YES	NO	Sensor calibration Signal for Modes 4 and 5
7	NO	NO	YES	YES	Sheet-Feed Machine
8	NO	NO	NO	NO	Not Used
9	NO	NO	NO	NO	
0	NO	NO	NO	NO	

SHEET FEED MODE (MODE 7)

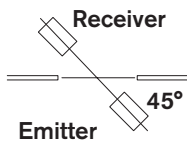

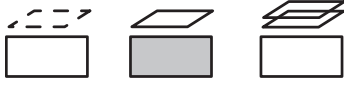

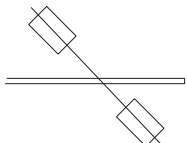


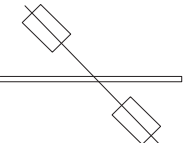

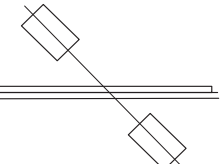
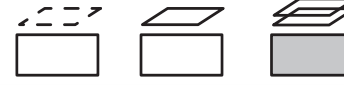
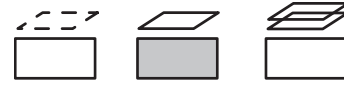
This mode is used for sheet-fed machinery where the sheets do not overlap but are separated by a gap between sheets. During the time when a single thickness of sheet is passing through the Sensor, the Normal Run Indicator glows. The Web Break Indicator glows during the gap between sheets, but the Web Break Relay at Terminals **7**, **8**, and **9** does not change state. A double feed will cause the Double Feed/Splice Indicator to glow and the Web Double Feed/Splice Relay at Terminals **10**, **11**, and **12** will change state.

If the Output Reset Selector Switch is in AUTO, the Web Double Feed/Splice Relay will return to its normal state after approximately 2 seconds. This time delay may set for any time in the range of 0.2-6 seconds. If the Output Reset Selector Switch is in MAN, the relay will not return to its normal state until the Reset Switch (located on the front panel) is pushed or a momentary contact is made between Terminals **15** and **16**.

TEST RUN IN SHEET FEED MODE

- Set the Mode Selector Switch to **7**.
- Set the Web Thickness Selector Switch appropriate to material being fed.
- Set the Output Reset Selector Switch as required to **AUTO** or **MAN**.
- Set the Power Switch to **ON**.
- Run the machine and feed sheets as normal.
- Observe the front panel indicators and compare to data for Mode **7** in Table 1.
- If errors occur, follow the correction suggestions in Table 3.
- The double sheet-feed function can be tested by pressing the Test Switch. When the red LED in the Test Switch glows, the double sheet-feed function can be tested without changing the state of the double sheet-feed relay at Terminals **10**, **11**, and **12**. Next, purposely feed two sheets through the Sensor. The Double Feed/Splice Indicator red LED should glow for approximately two seconds (if the Output Reset Selector Switch is set to AUTO), until the Reset Switch (located on the front panel) is pressed, or until momentary contact is made from Terminal **15** to **16** in MAN.
- Press Test Switch again after the test is completed. The red LED in the Test Switch will go out and the PC210 is back to normal operation. The relay will change state when a double feed occurs.
- Although the above test is required only when a new material is being run, the test may be performed at any time during normal operation.

TABLE 3 SHEET FEED MODE OPERATIONS

CONDITION	STATUS	CORRECTIVE ACTION
 <p>No Web in Sensor gap</p>	<p>Normal</p> 	None
	<p>Abnormal</p> 	<ol style="list-style-type: none"> 1. Is the Sensor installed and aligned correctly? 2. Has dust accumulated inside the Sensor tube?
	<p>Abnormal</p> 	<p>(Clean the Sensor tube with an air gun or remove the Sensor tube for cleaning.)</p>
 <p>Single sheet in Sensor gap</p>	<p>Normal</p> 	None
	<p>Abnormal</p> 	<p>Set the Web Thickness Selector Switch LEFT 0.002-0.008 in. [0.05-0.20 mm].</p>
 <p>Single sheet in Sensor gap</p>	<p>Abnormal</p> 	<p>Set the Web Thickness Selector Switch to the RIGHT side 0.008 In. - 0.031 in. [0.20-0.80 mm]</p>
 <p>Two sheets in Sensor gap</p>	<p>Normal</p> 	None
	<p>Abnormal</p> 	<ol style="list-style-type: none"> 1. Is the Sensor installed and aligned properly? 2. Has dust accumulated inside the Sensor tube? (Clean the Sensor tube with an air gun or remove the Sensor tube for cleaning.) 3. Is the Sensor signal calibrated correctly? (See Sensor Signal Calibration.)

WEB SPLICE ONLY (MODES 1 AND 4)

This mode is used for web feed machinery where the only desired measurements are normal run and web splice (See Table 1 for Output Configurations for Modes 1 and 4).

During normal run with a single thickness of web passing through the Sensor, the Normal Run Indicator LED will glow and the Web Break Relay at Terminals **7, 8, and 9** and the Web Splice Relay at Terminals **10, 11, and 12** will remain in their normal state.

(continued...)

OPERATION (continued...)

A web splice passing through the Sensor will cause the Web Splice Indicator to glow and the Web Splice Relay to change state. The Web Splice Relay and Indicator will remain in this state until:

- a. If output Reset Selector Switch is in the **AUTO** position, the Web Splice Relay and Indicator Light will return to their deenergized state after 2 seconds (factory setting), or 0.2-6.0 seconds as set in **REMOTE RESET TIME SELECTION**.
- b. If the Output Reset Selector Switch is in the **MANual** position, the Web Splice Relay and Indicator will return to their deenergized state only upon pushing the Reset Switch on the front panel or an Output Reset momentary contact closure on Terminals **15** and **16**.

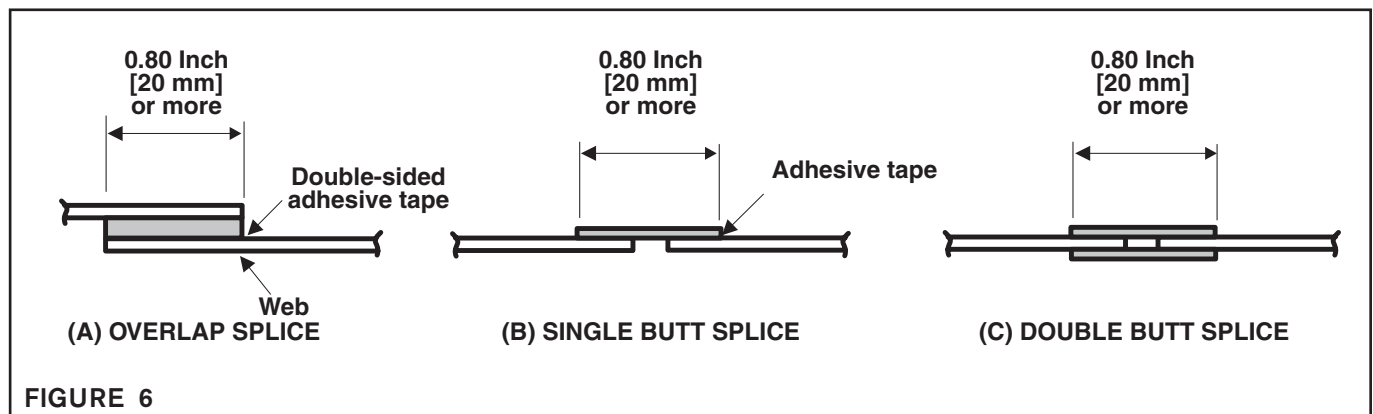
Refer to Figure 9 for descriptions of the various splice types and dimensions and observe the following rules which apply to all splice detection.

The splice must be at least 0.8 In. [20 mm] long.

Web thickness can be from 0.0004-0.003 In. [1-00.8 mm].

Splice thickness must always be at least 0.002 In. [0.05 mm]. It may be necessary to splice as at A or C to achieve this minimum value (See Figure 9).

If the splicing tape is less than half the thickness of the web, it will be necessary to splice as at A or C (See Figure 6).

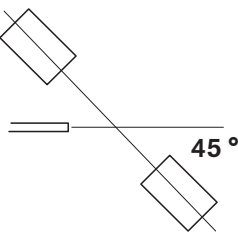


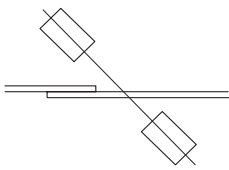

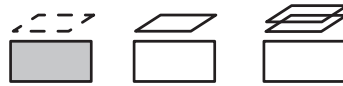

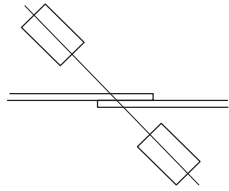





TEST RUN IN WEB SPLICE MODE (MODES 1 OR 4)

1. Set the Mode Selector Switch to **1** or **4** as required.
2. Set the Web Thickness Selector Switch to appropriate position, **LEFT** 0.002-0.008 in. [0.05-0.20 mm] or **RIGHT** 0.008-0.03 In. [0.20-0.80 mm].
3. Set the Output Reset Selector Switch to **AUTO** or **MAN**.
4. Set the Web Splice Sensitivity Control to **3**.
5. Set the Power Switch to **ON**.
6. Check operation (See Table 4).
7. The Test Switch can be pressed prior to testing to prevent the Web Splice Relay from changing state during a test. The red LED imbedded in the Test Switch glows while it is in test mode. Pressing the Test Switch a second time extinguishes the LED and allows the relay to operate normally.
8. The test described above can be performed at any time but is normally required only when the web thickness has changed.

(continued...)

TABLE 4
WEB SPLICE MODE - MODES 1 OR 4

CONDITION	STATUS	CORRECTIVE ACTION
 <p>45 °</p> <p>No Web in Sensor</p>	<p>Normal</p> 	None
	<p>Abnormal</p> 	<ol style="list-style-type: none"> 1. Is the Sensor installed and aligned correctly? 2. Has dust accumulated inside the Sensor tube? (Clean the Sensor tube with an air gun or remove the Sensor tube for cleaning.)
 <p>Single thickness of Web in Sensor</p>	<p>Normal</p> 	None
	<p>Abnormal</p> 	If the Web thickness is less than 0.002 In. [0.05 mm] thick, the Web Break Indicator will glow. Be sure the splice is more than 0.002 In. [0.05 mm] thick or the PC210 will not detect it.
	<p>Abnormal</p> 	Set the Web Thickness Selector Switch to 0.008-0.031 In. [0.20 - 0.80 mm].
 <p>A splice has passed through the Sensor</p>	<p>Normal</p> 	None
	<p>Abnormal</p> 	Increase the Web Splice Sensitivity Control setting from 3 -3.5. If the unit still does not respond, increase the setting to 4.0.
	<p>Abnormal</p> 	Lack of response is often caused by the tape being half or less than half the thickness of the web when using type B single butt splice. This situation can also be corrected by changing to a type A or C splice by using a thicker tape (See Figure 9).

WEB SPLICE AND WEB BREAK MODE (MODES 2 AND 5)

This mode is used where both web break and web splice detection are required.

Mode 2 and 5 are the same as Modes 1 and 4 for Web Splice Sensing with the addition of the following WEB

NOTE: Web thickness must be set at least 0.002 In. [0.05 mm] to use this mode.

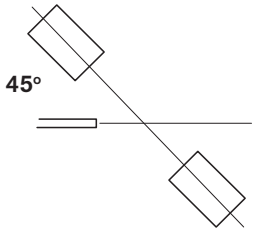

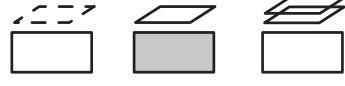
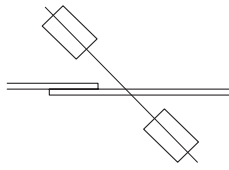
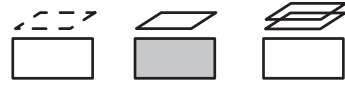

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OPERATION (continued...)

TEST RUN IN WEB BREAK OPERATION

1. Set the Mode Selector Switch to Mode 2 or 5.
2. Set the Web Thickness Selector Switch as appropriate for web.
3. Set the Power Switch to **ON**.
4. Check operation according to Table 5.
5. The Test Switch can be depressed prior to testing to prevent the Web Break Relay from changing state when a test piece is placed in the sensor path with an open section (which looks like a web break). The PC210 is in test mode when the red LED in the Test Switch glows. When the open section passes through the sensor, the Normal Run Indicator should go out and the Web Break Indicator should glow. The PC210 will return to normal State when a section of web reenters the Sensor.
6. Depress Test Switch again and the imbedded LED will go out, indicating the PC210 is back to normal operation and the Web Break Relay is operational.

TABLE 5 WEB BREAK OPERATION

CONDITION	STATUS	CORRECTIVE ACTION
 <p>45°</p> <p>No Web in Sensor</p>	<p>Normal</p> 	None
	<p>Abnormal</p> 	<ol style="list-style-type: none"> 1. Is the Sensor installed and aligned correctly? 2. Has dust accumulated inside the Sensor tube? (Clean the Sensor tube with an air gun or remove the Sensor tube for cleaning.)
 <p>Single thickness of Web in Sensor</p>	<p>Normal</p> 	None
	<p>Abnormal</p> 	Set the Web Thickness Selector Switch LEFT 0.002 - 0.008 In. [0.05 - 0.020 mm].

CALIBRATION

WEB SPLICE SENSITIVITY CONTROL

(See Figure 7)

This potentiometer adjusts PC210 sensitivity to splices. It has no effect in Sheet-Fed Mode 7.

The Web Splice Sensitivity Control is normally set to Position 3. In rare cases where the thickness of the splice is not twice the thickness of the web (as a butt splice made with single sided taping and very thin tape), it may be necessary to increase sensitivity (See Figure 6). The sensitivity should be increased slowly from 3 - 3.5 or even 4.

NOTE: An increase in sensitivity will also increase the possibility of false triggering. Increase sensitivity slowly and only as much as necessary.

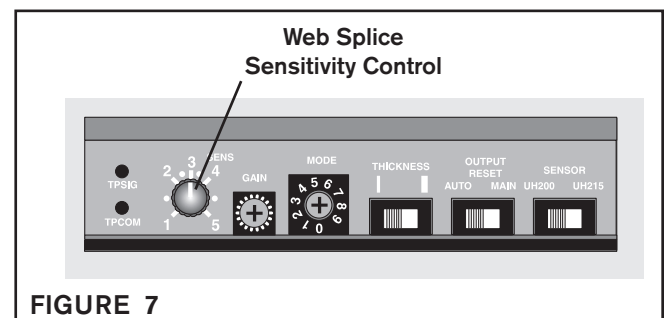


FIGURE 7

(continued...)

DETECTING SIGNAL LEVEL

This control is factory set for normal operation and in most applications does not require field adjustment.

If the web or sheet run in a machine is consistently less than 0.002 In. [0.05 mm] and the Normal Run Indicator LED will not come on (the Web Break Indicator LED stays on), it may be necessary to adjust the detecting signal level.

If the web or sheet used in the machine is over 0.031 In. [0.8 mm] and the Normal Run Indicator LED will not come on (Double Feed/Splice Indicator stays on), it may also be necessary to adjust the detecting signal level.

1. Select Mode **3** or **6** as appropriate for the machine speed.
2. Have a sample of the problem material on hand.
3. Set the Power Switch to **ON**.

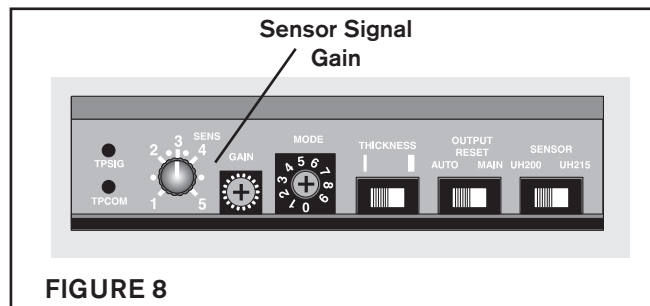


FIGURE 8

4. Insert the problem material into the Sensor.
5. Adjust the Sensor Signal Gain until the red LED for Web Break or Double Feed/Splice goes out and the green LED for Normal Run comes on (See Figure 8).
6. Set the Power Switch to **OFF**.
7. Select Operating Mode **1, 2, 4, 5, or 7** as appropriate.

AUTOMATIC RESET TIME SELECTION

The factory preset for Automatic Time Selection is approximately 2 seconds. This time can be changed to anywhere from 0.2-6 seconds with VR1, located on the printed circuit board. To select a time other than the factory preset time adjust VR1 as follows:

1. Turn power OFF using the Power Switch located on the front panel of the PC210 (See Figure 9).
2. Remove the four screws and Top Cover from the PC210 (See Figure 9).
3. Turn power ON using the Power Switch located on the front panel of the PC210 (See Figure 9).
4. Locate VR1 on the main printed circuit board (See Figure 10).
5. Adjust VR1 until the desired reset time is selected (See Figure 11 for approximate time delay positions).
6. Test the reset time by inserting a splice or double sheet into the Sensor until the Web Splice/Double Sheet-Feed triggers with the Reset Selection in **AUTO**; then, observe the time until the relay resets.
7. Turn power OFF using the Power Switch located on the front panel of the PC210 (See Figure 9).
8. Replace the Top cover and the four screws (See Figure 9).

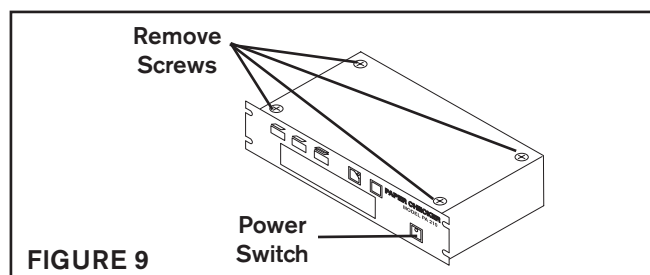


FIGURE 9

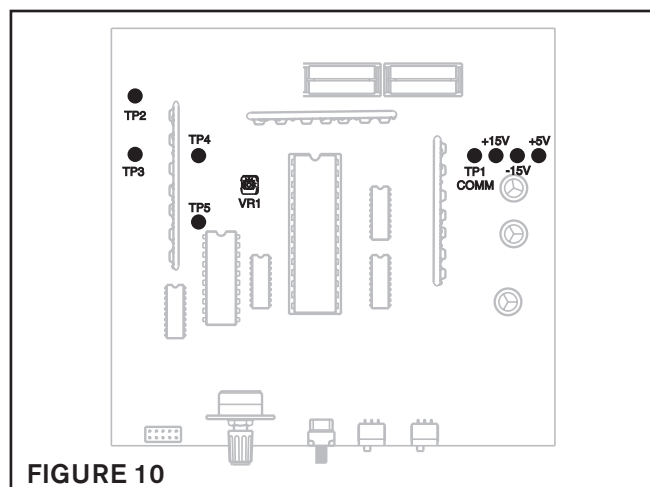


FIGURE 10

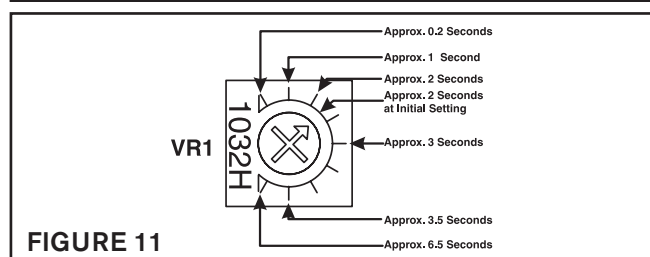


FIGURE 11

SPECIFICATIONS

Power Supply	100 to 240VAC, 50 or 60 Hz
Power Consumption	10VA
Ambient Temperature	32°-120° F [0°-50° C]
Input	SENSOR SYNCHRONOUS SIGNAL 5VDC, 10mA Dry Contact or Open Collector Output Reset 5VDC, 10mA Dry Contact or Open Collector
Output	WEB BREAK - Dry Contact Rated 240VAC, 0.1 Amp; 24VDC, 0.1 Amp DOUBLE SHEET-FEED/WEB SPLICE - Dry Contact Rating: 240VAC, 0.1 Amp; 24VDC, 0.1 Amp
Line Speed	Web-Feed 3,300 fpm [1,000m/min] Max. Sheet-Feed 1650 fpm [500 m/min] Max.
Weight	4.4 lb [2 kg]

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