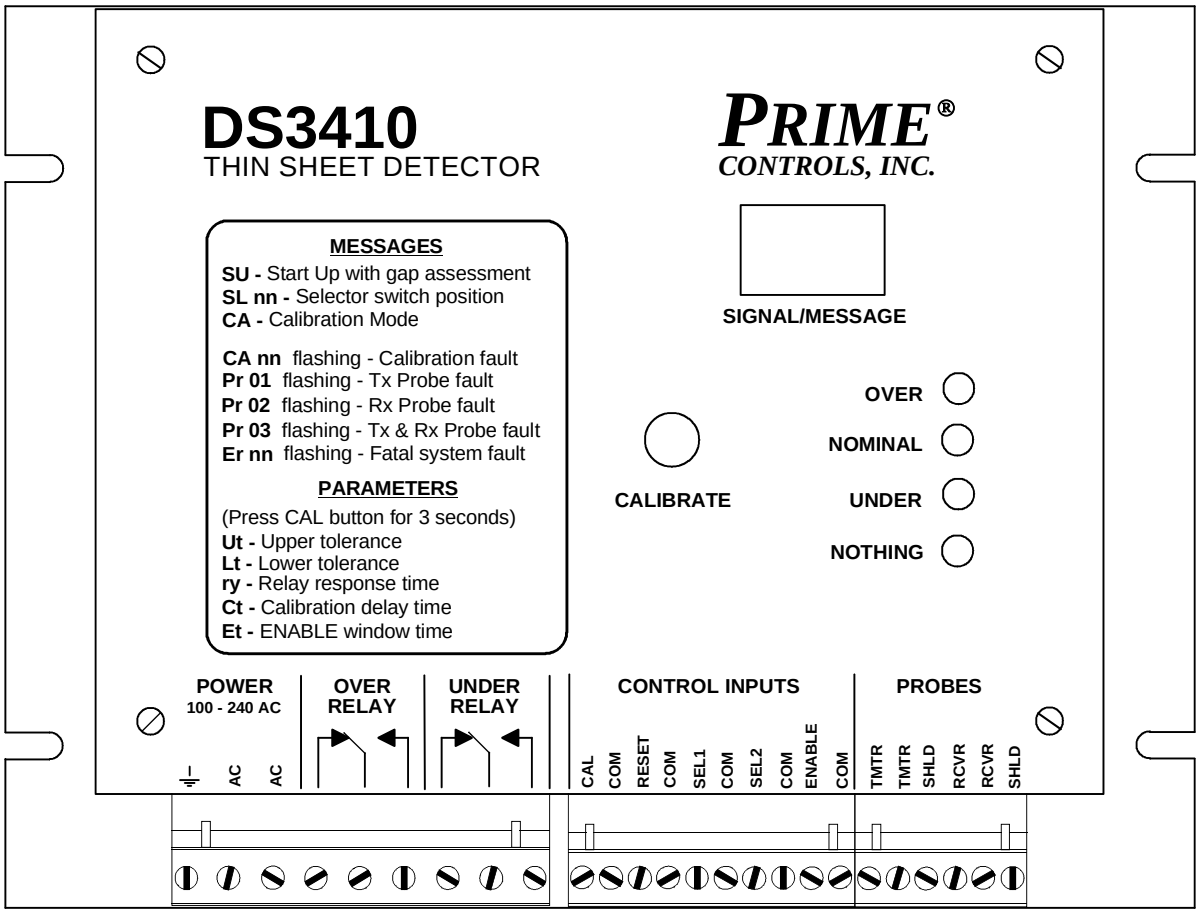
OPERATING INSTRUCTIONS

MODEL **DS3410** THIN SHEET DETECTOR



DESCRIPTION

The Model DS3410 Thin Sheet Detector comprises a control module in a sheet metal housing with two probes to form a system that detects foils, stainless steel, or pre-etched double circuit boards passing between the probes. The detector system may be used on automatic sheet feeders where double or overlapped sheet material may jam or damage the receiving machine. A double feed produces an output to stop the machine or signal the operator. The unit can also be used to detect metal that is too thin as it is capable of reporting an "under" condition as well as "over". The thickness is reported, via two form C relays, as “nominal”, “over”, “under” or “nothing”. When appropriately configured the system retains up to eight calibration setups.

System Features

The DS3410 is a flexible gauging system with a variety of features, some of which may be enabled or disabled through the positioning of DIP switches located beneath the control module cover. The various features include:

- Accommodates several different probes for different mounting arrangements and area coverage.
- Calibration on single nominal thickness (one-hit) or calibration on two different thickness samples (two-hit) for tighter tolerance control.
- Automatic frequency selection for most applications, fixed high frequency for thinner stainless materials.
- Independent over and under tolerance adjustment in 1 percent increments.
- Optional multiple calibration memories.
- Optional gauge windowing for gauging only a targeted area.

Control Module

The features of the control module include:

- Universal power input accommodates AC voltages from 100 to 240 volts.
- Removable terminal blocks for quick change-out of the control module.
- Separate form C relay outputs for independent reporting of OVER and UNDER conditions.
- LED indicators report the current gage states of NOTHING, UNDER, NOMINAL, and OVER.
- Automatic setup of system gain and operating parameters.
- External or front panel calibration through a contact closure or the front panel push-button switch.
- Four calibration memories that are selected through the SEL1 and SEL2 terminals and optionally eight calibration memories with ENABLE configured as SEL3. These memories allow quick changeover between materials of different nominal thickness. The memory contents are retained even when power is removed from the unit.
- Latching OVER and UNDER outputs that are cleared by asserting the RESET input.
- Probe fault reporting on the two-digit display warns of broken or disconnected probes or cables.

Control Module Indicators

The function of the indicators and display on the DS3410 control module are described in the following paragraphs:

1. OVER LED is ON whenever the material thickness exceeds the calibrated nominal value by more than the set tolerance.
2. NOMINAL LED is ON whenever the received signal is within the specified tolerances, both over and under.
3. UNDER LED is ON whenever there is material between the probes but the material is thinner than the calibrated nominal value by more than the set tolerance.
4. NOTHING LED is ON whenever the received signal goes beyond the measuring range of the instrument indicating an absence of material between the probes.
5. The OVER, NOMINAL, UNDER, and NOTHING LEDs flash in succession when the system is in calibrate mode.
6. The numeric display indicates the level of the signal from the receiving probe and reports error or status conditions. During gauge operation the value on the display reflects the strength of the signal from the receiving probe. Thicker materials reduce the level of the signal reaching the receiving probe, consequently the displayed value is lower for thicker material and higher for thinner material.

Control Module Calibrate Push Button

The push-button switch on the front panel of the control module serves to initiate the calibration process and to make adjustments to several numeric parameters including the upper tolerance (**Ut**), the lower tolerance (**Lt**), the relay response time (**ry**), the single-hit calibration delay time (**Ct**), the one-shot gauge window time (**Et**), and reject/not reject when nothing between the probes (**rE**).

To initiate calibration, simply press the push button and release it within 3 seconds.

To view the current value of a parameter, press the push button and hold it for more than 3 seconds until the appropriate parameter identifier appears on the digital display. After the parameter identifier appears, release the push button and the current value of the parameter displays for 5 seconds. To retain the current value of the parameter, simply allow the 5 second display interval to elapse. The display reverts back to displaying signal strength.

To change the value of a parameter, press the push button and hold it for more than 3 seconds until the appropriate parameter identifier appears on the digital display. After the parameter identifier appears, release the push button and the current value of the parameter displays. Press the push button while the parameter is displaying and the value increments, first slowly then more rapidly. For more precise control of the value adjustment, simply tap the push button repeatedly until the desired value is displayed. All parameters roll back to their minimum values after reaching the maximum value. To retain the adjusted value of the parameter, simply allow the 5 second display interval to elapse. The display reverts back to displaying signal strength.

Control Module Configuration Switches

A four position switch is located on the main control circuit board beneath the front cover and to the left of the displays (often hidden beneath the blue or gray ribbon cable). These switches must be set to enable the features of the system that are appropriate to your application. Any time a switch setting is changed, the control module must be powered down and back up to install the change. The switches are read only at power up.

The functions of the switches are as follows:

Switch 1:	OFF	Calibrate on single only.
	ON	Calibrate on single and double.
Switch 2:	OFF	ENABLE acts to enable gauging.
	ON	ENABLE acts as a SEL3 input for calibration memory selection.
Switch 3:	OFF	The system determines the optimum operating frequency.
	ON	The operating frequency is fixed at a high value for very thin materials.
Switch 4:	OFF:	During setup the relays are set to NOT cause a reject.
	ON:	During setup the relays are set to a state to reject both for OVER and UNDER .

Control Module Polarity Jumpers

Each of the logic inputs (CAL, RESET, SEL1, SEL2, and ENABLE) to the DS3410 has associated with it a two position jumper plug located under the front cover and immediately behind its associated connector. These jumpers allow the inputs to be driven by a sinking (NPN) or sourcing (PNP) device. When the jumper plug is installed on the pins closest to the connector, the input is set up for a sourcing driver. When installed on the two pins farthest from the connector, the input is set up for a sinking driver, or dry contact between the input and COM.

Whether set for sinking or sourcing drivers, the input is active (ON) when the signal at the terminal is low (at COM).

APPLICATION CONSIDERATIONS

Choice of Probes

The DS3410 accommodates several models of Prime probes but is most often used with the Type "AX" probe. The probes and their features are listed in the table below:

Probe	Housing	Connection	Gap
AX	Threaded Steel Barrel	Cable	0.5" to 0.75"
P1C	Smooth Steel Barrel	Connector	0.5" to 0.75"
P1CS	Smooth Stainless Barrel	Connector	0.5" to 3.0" (app. dependent)
P1SH	Smooth Stainless 1" Barrel	Connector with 15" pigtail	0.5" to 3.0" (app. dependent)
P1T18P	18mm Threaded PVC Barrel	Connector	0.5" to 3.0" (app. Dependent)

Sensing performance of the AX and P1C probes is identical. The P1CS, P1SH, and P1T18P probes provide broader sensing area and may allow greater separation of the probes.

All of the above probes are potted and completely sealed. Two probes are required with each control.

Choice of Single or Double-Hit Calibration

The DS3410 is designed to discriminate between the standard weights of copper on printed circuit boards. For this application, calibration on single thickness is adequate and convenient. For printed circuit applications, the upper and lower tolerances are typically set to 20% however they can be set tighter or looser depending upon the specifics of the situation.

For highest gauging precision, the double sheet detector should be calibrated on both a single and a double thickness of the material to be monitored. The system utilizes the readings from both the single thickness and the double thickness to establish the over and under thresholds of the gauge value. The system multiplies the difference between the single and double cal values by the upper threshold percentage (**Ut**) to establish the "over" threshold. It multiplies the difference between the single and double cal values by the lower threshold percentage (**Lt**) to establish the "under" threshold.

The double-hit mode of calibration is selected when Switch 1 is ON.

For both double and single-hit calibration, the values are retained even when power is removed from the DS3410.

Using the Gauge Window Timer

The DS3410 offers a feature that can be used to limit the region inspected on printed circuit boards or other material samples. A contact closure or low-going signal applied to the ENABLE input of the DS3410 causes gauging to commence for the time interval set into the parameter **Et** (See Enable Window Time under INITIAL SETUP). At the end of the window time, gauging stops until the signal on ENABLE again transitions from high to low.

The window time can be set from .01 seconds to .99 seconds. When set to .00 seconds, the window timer feature is disabled and gauging is continuous.

INSTALLATION

The installation of the components of the Thin Sheet Detector system is covered in the following paragraphs:

DS3410 Control Module

The control board is designed to mount on the back panel of an electrical enclosure using the four mounting slots at the edges of the enclosure. The footprint is 210 mm (8.25 inches) by 159 mm (6.25 inches) with mounting slot locations on a rectangle 194 mm (7.625 inches) in the horizontal and 102 mm (4.0 inches) in the vertical. Insure that the mounting screws make good electrical contact between the module housing and the control enclosure back panel.

Avoid mounting locations with excessive heat and vibration.

Type "AX" Probes

The probes must be mounted so that they face each other with typically a 1/2" gap between the sensing faces. The PC boards should not pass closer than 1/16" from the sensing faces. The probe gap may in some cases be as large as ¾". If the probe gap is too large, the unit, at power up will never exit the setup state (will flash **SU** indefinitely).

The body of each probe has a 1-1/4 x 12 NF thread. They can be threaded into tapped holes or held in brackets with jam nuts.

Type P1C and P1CS Probes

These probes operate the same as the "AX" probes but require clamp type of mount. The body of these probes measures 0.94 inches (23.8 mm) in diameter by 2.0 inches (51 mm) long.

Type P1SH Probe

This probe operate the same as the "AX" probes but require clamp type of mount. The body of this probe measures 0.94 inches (23.8 mm) in diameter by 1.0 inches (25.4 mm) long.

Type P1T18P Probe

This probe operate the same as the "AX" probes but the body has an 18mm x 1mm thread. The probe measures 0.709 inches (18 mm) in diameter by 2.0 inches (5 mm) long.

Probe Wiring

The cables from the probes to the DS3410 are normally run in conduit. The cables and the DS3410 circuitry form a tuned circuit but the DS3410 is capable of determining the optimum operating point for the specific installation. However, this requires that there be nothing in the space between the probes whenever the DS3410 is powered up.

Control Module Wiring

All wiring for the DS3410 connects to removable terminal blocks at the bottom of the control enclosure as described in the following paragraphs.

1. Connect 100 to 240 VAC, 50-60 Hz. power (15 watts) to the terminals labeled AC on the leftmost terminal block.

2. Connections to the control circuit of the machine are made through the OVER and UNDER form C relays as required. These relays are powered in the NOMINAL condition and the diagram on the DS3410 front panel reflects the NOMINAL state. The NOTHING state places the relays in the same state as NOMINAL.

3. The shielded cables from the probes to the board should be run in conduit. The receiver probe is connected to terminals labeled RCVR on the rightmost terminal block and the transmitter probe to the terminals labeled TMTR on the same terminal block. Since the probes are non-polarized, the order of lead connection is not important and since the probes are identical, it does not matter which one is the transmitter and which one is the receiver. Connect the shield leads (drain wires) from the probe cables to the terminals labeled SHLD.

4. The OVER and UNDER relays may be operated in a "follower" mode or a "memory" mode depending upon the wiring of the RESET input. The operational modes and required connections are described below.

a) For "follower" mode, jumper RESET and COM together on the center terminal block. In this mode, when an OVER or UNDER condition occurs, the appropriate relay drops out, and the OVER or UNDER LED comes on. After the fault condition is corrected, the relay returns to the normally energized condition and the LED goes out. Automatic reset is normally selected to control the operation when the fault condition is automatically removed or the DS3410 is wired into the stop circuit of the machine.

b) For "latch" mode, wire the RESET and its associated COM terminal to the normally open contacts of a switch, relay, or controller output. In this mode, when a fault condition occurs, the relay drops out and the OVER or UNDER LED comes on. After the fault condition is corrected, the contact must be momentarily closed to energize the relay.

5. Calibration Enable. Connect a N.O. push button across the terminals labeled CAL and COM. Closing a contact across these terminals initiates a calibration cycle. If there is no material between the probes when calibration is initiated, the DS3410 waits for material to be presented and then after a time delay determined by the setting of switch 1, actual calibration begins.

   The calibration data is stored in the non-volatile memory as selected by the signals on SEL1 and SEL2 (and ENABLE if the ENABLE input is used for memory select per the switch 2 setting). Use of the CAL input is optional since the push button on the DS3410 front panel performs the exact same function. This input simply allows the calibration function to be initiated remotely.

6. Switches or contacts may be connected between SEL1 and COM and SEL2 and COM to allow selection of four different calibration memories. Calibration data is stored in the memory that is selected at the time calibration occurs. Switching between calibration datasets can be done at any time during DS3410 operation.

   DIP switch 2 allows the ENABLE input to be used as a third memory select input. When switch 2 is ON, the ENABLE input acts an SEL3 input providing another four memories for calibration for a total of eight. The memories are selected through the binary combination of signals on the SEL and ENABLE inputs as follows:

Memory	SEL1	SEL2	ENABLE	Switch 2
1	off	off	off	on or off
2	on	off	off	on or off
3	off	on	off	on or off
4	on	on	off	on or off
5	off	off	on	on
6	on	off	on	on
7	off	on	on	on
8	on	on	on	on

INITIAL SETUP

Probe and Gap Assessment

The startup process of the DS3410 commences immediately after power up and includes several processes which are transparent to the user except for the sequence of characters that appear on the two-digit display.

When the unit first powers up, a sequence of characters flashes on the two-digit display. Typically the startup display sequence includes momentary flashing of **SU**, followed by momentary flashing of the selected calibration memory identifier, e.g. **SL 01**.

If the probes are faulty, disconnected, or cannot be identified, the controller flashes **PR 01** for transmitter probe fault, **PR 02** for receiver probe fault, or **PR 03** for faults on both probes.

During the startup sequence, the system assesses the readings for nothing in the gap between the probes. *For this assessment there must be no material between the probes*.

When the operating conditions have been established, the two-digit readout displays a numeric value representing the receiver signal strength.

Gauge Tolerance Adjustment

When the startup sequence has been completed successfully, the system enters gauge mode and displays the receiver signal strength on the two-digit display. At this point the gauging tolerances should be verified and/or set as described below: If more than one calibration memory is to be used, the tolerances must be adjusted independently for each stored calibration. The tolerance adjustments may be done any time except when the system is in calibration mode (displaying "**CA**").

1. Press and hold the calibration push button for 3 seconds or until the unit displays "**Ut**" (**U**pper **t**olerance). Release the push button and observe the setting for the upper tolerance value. The tolerance displays as a percentage of the single thickness and can be adjusted from a value of 1 to 99. If the push button is not pressed again within 5 seconds, the display reverts back to displaying gauge signal strength and the current upper tolerance value is retained. To change the upper tolerance, tap or hold in the push button as necessary to adjust the upper tolerance to the desired value. For detection of doubles, 50% is a good value. Retain and store the displayed value by releasing and not activating the push button for 5 seconds. The display reverts back to showing signal strength.
2. Press and hold the calibration push button for 4.5 seconds or until the unit displays "**Lt**" (**L**ower **t**olerance). Release the push button and observe the setting for the lower tolerance value. The tolerance displays as a percentage of the single thickness and can be adjusted from a value of 1 to 99. Tap the push button as necessary to adjust the lower tolerance to the desired value. If gauging for "under" is of no interest, set the lower tolerance to a high value such as 99%. Retain the displayed value by releasing and not activating the push button for 5 seconds. The display reverts back to showing signal strength.

Relay Response Time

The relay delay value displays in seconds and can be adjusted from zero (.00) to .99 seconds.

The relay delay current value can be viewed by pressing and holding the CAL push button until the "**ry**" identifier appears on the two-digit display. Release the push button and observe the current value of the delay parameter. Press and/or tap the CAL push button as necessary to bring the delay parameter to the desired value. To retain the adjusted value of the parameter, simply allow the 5 second display interval to elapse. The display reverts back to displaying signal strength.

The relay delay can be used as a filter to insure the system does not respond to anomalies or fast but unimportant changes in gauging signal.

Gauge Window Time

The gauge window timer, when set to zero, is disabled and gauging is continuous whenever the ENABLE signal is low (unless the ENABLE input is being used for memory selection). When set to a value from .01 seconds to .99 seconds, the DS3410 actively gauges the material between the probes for the period of the timer whenever the ENABLE input transitions from high to low. The gauging is on a one-shot basis.

The window interval current value can be viewed by pressing and holding the CAL push button until the "**Et**" identifier appears on the two-digit display. Release the push button and observe the current value of the window time. Press and/or tap the CAL push button as necessary to bring the time parameter to the desired value. To retain the adjusted value of the parameter, simply allow the 5 second display interval to elapse. The display reverts back to displaying signal strength.

Reject on Nothing (Applies only to Version 2.4 and later firmware)

The DS3410 can be set to report an "under" condition on the relays when no material is between the probes. Press and hold the CAL push button until the "**rE**" identifier appears on the two-digit display. Release the push button and observe the current value as either 00 or 01. When the 00 setting is in effect, the DS3410 sets the OVER and UNDER relays to the accept states when nothing is sensed between the probes. When the 01 setting is in effect, the UNDER relay is set to the reject state whenever there is nothing between the probes and the ENABLE input is active. To change between the two settings, simply press the push button while the value is being displayed and the alternate state toggles in. To retain the adjusted value of the setting, simply allow the 5 second display interval to elapse. The display reverts back to displaying signal strength.

CALIBRATION

The DS3410 offers two modes of calibration: 1) calibration on a single thickness material sample, and 2) calibration on single and double material samples.

Calibration on Single and Double Thickness

For highest gauging precision, the double sheet detector must be calibrated on both a single and a double thickness of the material to be monitored, any time prior to running. This mode of calibration is selected when Switch 1 is ON. Calibration values are retained even when power is removed from the DS3410. Depending upon selected options, the system can retain one,

four, or up to 8 different calibration settings in non-volatile memory. See the separate section on MULTIPLE CALIBRATION MEMORIES. To calibrate on single and double, proceed as follows:

NOTE: Calibration must be done Single Thickness calibration first, followed by Double Thickness calibration. Reversing the order will result in an UNDER condition for the SINGLE and a NOMINAL condition for the DOUBLE.

1. Set the memory select inputs (SEL1 and SEL2 and optionally ENABLE) to select the desired calibration memory.

2. Place a single sheet of the thickness to be gauged in the probe gap and press the CAL push button or close a contact across the external CAL input. If the first point calibration is successful, the unit display alternates between "**CA**" and the signal strength "value" of the single sheet calibration and flashes the LEDs sequentially for 30 seconds or until the double sheet is calibrated on. At this point it is ready to calibrate for the double sheet signal strength value.

If the calibration is not successful, the unit displays alternately "**CE**" and "**01**" if the signal is too weak or "**CE**" and "**02**" if the signal is too strong. Calibration may be attempted again immediately. If calibration is not re-attempted, after 30 seconds the unit reverts to the state prior to the attempted calibration.

3. Place a double thickness of material to be gauged in the probe gap and press the CAL push button or close a contact across the external CAL input. When calibration is complete the signal strength value returns to the display and the "OVER" led should be iluminated.

   NOTE: Calibration on the double thickness must be done within 30 seconds of completing the single thickness calibration or the unit will exit calibration mode and revert back to the previous calibration points.

4. The unit should now read Nominal for a Single thickness and Over for a Double thickness.
5. Adjust the gauge tolerance values if necessary (See Gauge Tolerance Adjustment under INITIAL SETUP) and proceed with normal operation.

Calibration on Single Thickness

Switch 1 OFF, selects calibration on single thickness. For proper operation, the double sheet detector must be calibrated any time prior to running or, optionally, the unit may calibrate on the first board or sheet of a run. Calibration values are retained when power is removed from the DS3410. Up to four (optionally eight, depending upon switch 2 setting) different calibration settings may be retained in the calibration memories as determined by the signals on the SEL1 and SEL2 (and optionally ENABLE) inputs.

1. Set the memory select inputs (SEL1 and SEL2 and optionally ENABLE) to select the desired calibration memory.

2. Enter the "Calibrate" mode by momentarily closing a contact across the CAL and COM terminals or pressing the push-button switch on the front of the DS3410 control module. The unit displays "**CA**" and flashes the LEDs sequentially as it calibrates or as it waits for material to come between the probes. The external contact may remain closed as the single sheet feeds through the probe gap, but must be opened before a second sheet is fed.

3. Pass a single sheet of the thickness to be gauged through the probe gap. The sheet may be inserted in the gap before initiation of the calibrate mode, but must be in the gap for at least duration of the calibration delay ("**Ct**") for proper calibration. The intent of the calibration delay is to insure that a slow-moving calibration target is fully between the probes when calibration begins.

Gauging commences immediately after calibration but only if the push button is released and the contact across CAL and COM is released. If either of the calibration initiating signals persists, the unit hangs in a wait state.

The DS3410 is capable of distinguishing 1/2, 1, or 2 ounce double or single sided circuit board material. However, two sided, 1/2 ounce material gages the same as 1 sided 1 ounce material, and 2 sided 1 ounce material gages the same as 1 sided 2 ounce material.

FIRMWARE VERSION

From time to time, as improvements are made to Prime products, the firmware controlling the units is revised. When setting a unit up or troubleshooting it may be necessary to determine the version number for the firmware installed in your unit. The version numbers begin with 1.0 and are incremented either by tenths (1.1, 1.2, etc.) for small revisions or by the integer digit (1.0, 2.0, etc.) for more significant revisions.

To determine the version of the firmware running in your unit, simply hold the calibration push button in as power is applied to the unit. The revision number will be displayed on the two-digit display alternately with the letters "Fr". For example, Version 1.8 will flash alternately "Fr" and "1.8".

SPECIFICATIONS

Power Requirements

95 to 130 volts, 50/60 Hz at 100mA.

Logic Input Electrical Specifications

CAL, RESET, SEL1, SEL2, ENABLE:	30 Volts maximum Upper switch threshold - 6.9 volts Lower switch threshold - 3.3 volts

When the internal jumper is installed for pull up to accommodate sinking drivers, the input is pulled to +15 volts through 4700 ohms. When the jumper is installed for pull down to accommodate sourcing drivers, the input is pulled to common through 4700 ohms.

Output Relay Specificaitons

Maximum switched voltage	380 VAC
Maximum switched current	14 amps N.O., 5 amps N.C., AC resistive 8 amps DC
Maximum switched power	200W DC, 2000 VA AC.
Minimum required contact load:	12V, 100mA
Expected mechanical life:	20 million operations
Expected electrical life:	100,000 operations at 8 amps, 240 VAC 50,000 operations at 14 amps N.O., 5 amps N.C. 120 VAC resistive 30,000 operations at 7.2 FLA, 45 LRA, 120 VAC 10,000 operations at 5 FLA, 30 LRA, 240 VAC

TROUBLESHOOTING

Should trouble develop, proceed as follows:

1. Check AC input power to the control module

2. Check the fuse, accessible at the lower left side of the DS3410 housing.

3. If the unit powers up, initializes and the LEDs indicate a response to the materials in the gap but the relays do not switch, check that the outputs are enabled (jumper or contact closure between ENABLE and COM) and that the relays are set to follow and not to latch (activate the RESET input to unlatch). For most installations, simply install jumpers between RESET and COM and between ENABLE and COM.

4. If **PR** and **01** flash alternately on the display, check the transmitting probe for proper connection and continuity.

5. If **PR** and **02** flash alternately on the display, check the receiving probe for proper connection and continuity.

6. If **PR** and **03** flash alternately on the display, check both probes for proper connection and continuity.

7. If the unit displays **SU** on the display for longer than 10 seconds after power up, insure that nothing is between probes. If no material is between the probes, decrease the separation of the probes.

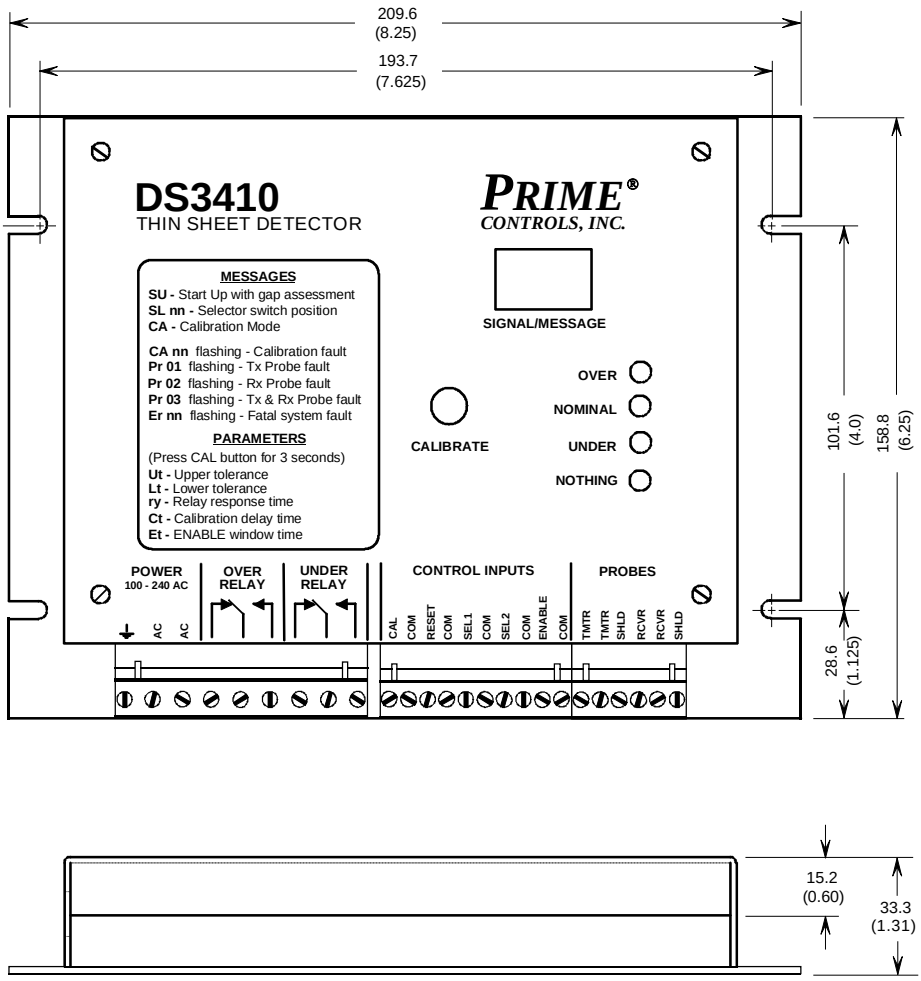
8. If **SU** and **04** flash alternately on the display, the probe gap is too small. Increase the separation of the probes.

9. Power the unit down and back up again *with nothing in the probe gap*. Insure the numeric display reads 99. If not, check the probe gap for a range of 1/2 to 3/4 inch.

10. A display flashing **CE** and **01** during calibration indicates the signal is too weak. The probes may be separated too far or the material too thick for the detector.

11. A display flashing **CE** and **02** during calibration indicates the signal is too strong. The probes may be too close together or the material too thin for the detector.

For further information or service assistance, contact Prime Controls, Inc., 4528 Gateway Circle, Dayton, Ohio 45440-1712. Phone: (937) 435-8659. Mention model number and serial number.


209.6
(8.25)
193.7
(7.625)
DS3410
THIN SHEET DETECTOR
PRIME®
CONTROLS, INC.
MESSAGES
SU - Start Up with gap assessment
SL nn - Selector switch position
CA - Calibration Mode
CA nn flashing - Calibration fault
Pr 01 flashing - Tx Probe fault
Pr 02 flashing - Rx Probe fault
Pr 03 flashing - Tx & Rx Probe fault
Er nn flashing - Fatal system fault
PARAMETERS
(Press CAL button for 3 seconds)
Ut - Upper tolerance
Lt - Lower tolerance
ry - Relay response time
Ct - Calibration delay time
Et - ENABLE window time
SIGNAL/MESSAGE
OVER
NOMINAL
UNDER
NOTHING
CALIBRATE
POWER
100 - 240 AC
AC
AC
OVER RELAY
UNDER RELAY
CONTROL INPUTS
CAL
COM
RESET
COM
SEL1
COM
SEL2
COM
ENABLE
COM
PROBES
TMTR
TMTR
SHLD
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RCVR
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101.6
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158.8
(6.25)
28.6
(1.125)
15.2
(0.60)
33.3
(1.31)

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