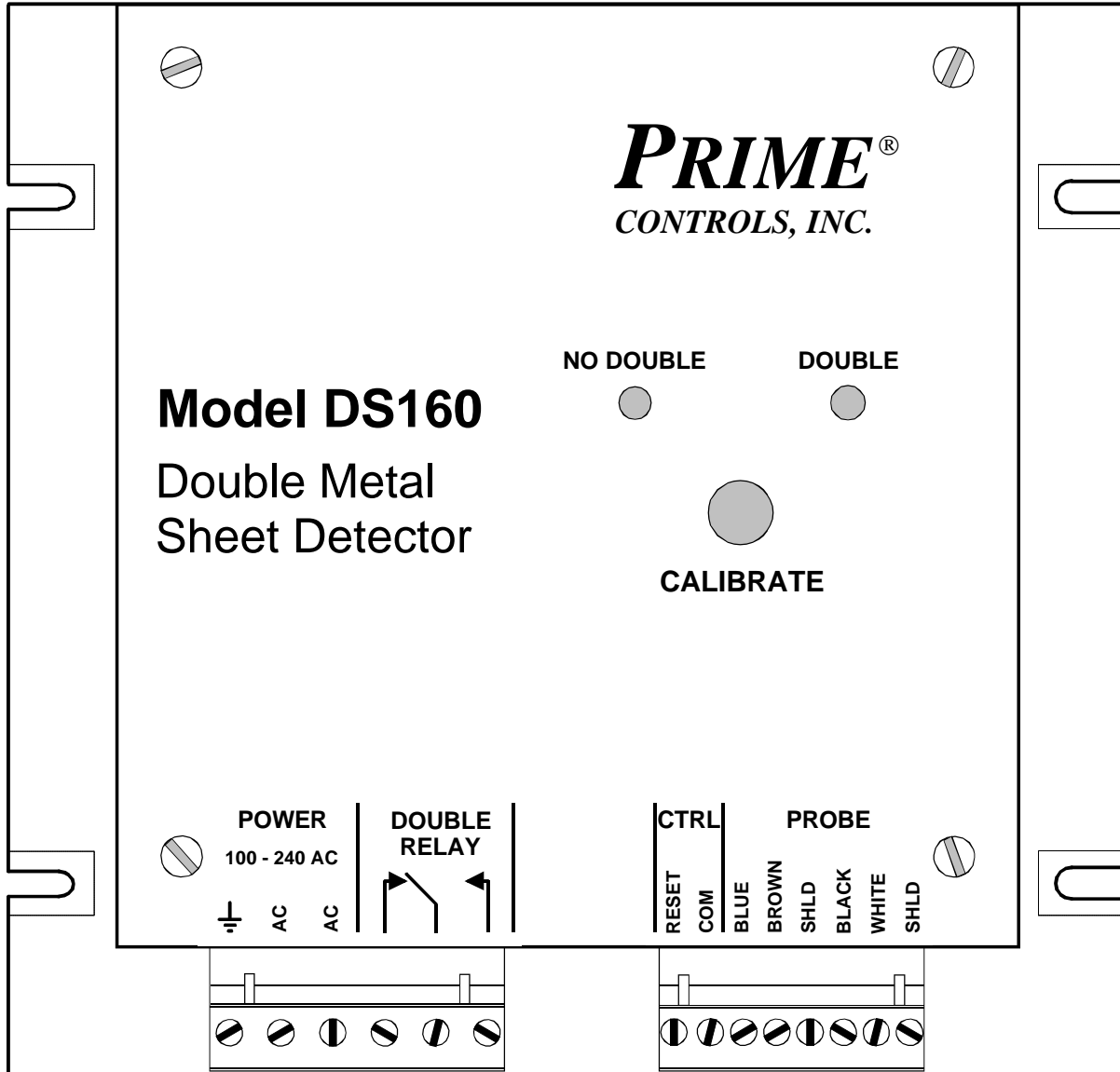


# OPERATING INSTRUCTIONS

## Model **DS160** DOUBLE SHEET DETECTOR



### DESCRIPTION

The Model DS160 Double Metal Sheet Detector comprises a control module in a sheet metal housing with one probe to form a system that detects the thickness of non-ferrous metals in front of the probe. The detector system may be used on automatic sheet feeders where double or overlapping sheet material may jam or damage the receiving machine. A double feed produces an output to stop the machine or signal the operator.

## **Control Module**

The features of the control module include:

Fast and easy pushbutton calibration

Select 95 to 130 or 200 to 250 volt operation through internal jumpers.

Removable terminal blocks for quick change out of the control module.

Form C relay output providing normally open or normally closed contacts.

LED indicators report the gage states of NO DOUBLE and DOUBLE.

Automatic setup of system gain and operating parameters.

Non-volatile memory that retains all calibration parameters even when power is removed.

Latching relay output that is cleared by asserting the RESET input.

## **Probe**

The DS160 requires one P10T30P probe. The probe is potted and completely sealed. The probe connects to the control module through a four conductor shielded cable, Prime Model CBL104-3.

## **INSTALLATION**

Installation of the components of the DS160 system is covered in the following paragraphs:

### **DS160 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 165 mm (6.5 inches) by 159 mm (6.25 inches) with mounting slot locations on a rectangle 149 mm (5.875 inches) in the horizontal and 102 mm (4.0 inches) in the vertical (see drawing at end of this document). Insure that the mounting screws make good

electrical contact between the module housing and a well grounded control enclosure back panel.

Avoid mounting locations with excessive heat and vibration.

### **P10T30P Probe**

The P10T30P probe is very sensitive to surrounding metals and must be mounted in non-metallic brackets such as Nylatron. For greatest sensitivity, no metal should be within one inch (25mm) of the threaded probe body. Where multiple probes are used, they must be separated from each other by about 1.5 inches (40 mm).

### **Electrical Wiring**

All wiring for the DS160 connects to removable terminal blocks at the bottom of the control enclosure as described in the following paragraphs.

1. Connect I00 to I30 VAC, 50-60 Hz. power (15watts) to the terminals labeled AC on the left terminal block. Connect earth ground to the terminal labeled with the ground symbol.
2. For 200 to 260 volt operation, remove the DS160 cover and remove suitcase jumpers A and C immediately in front of the gray transformer. Place one of the suitcase jumpers in position B. Discard the second jumper. Replace the cover.
3. Connections to the control circuit of the machine are made through the form C relay. This relay is powered in the NO DOUBLE condition and the diagram on the DS160 front panel reflects the NO DOUBLE state.
4. The shielded cable from the probe to the control unit should not be run adjacent to AC power cables or electrically noisy conductors of any type. The probe wires connect according to their colors to the terminals labeled BLUE, BROWN, BLACK, and SHLD. These connection designations assume the use of Prime cable CBL104-3 or exact equivalent. Connect the shield lead (drain wire) from the probe cable to one of the terminals labeled SHLD. The second SHLD connection is unused.
5. The output relay may be operated in a "follower" mode or "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 a DOUBLE condition occurs, the relay drops out and the DOUBLE indicator comes on. When the double condition is corrected, the

relay returns to the normally energized condition, the DOUBLE indicator goes out and the NO DOUBLE indicator comes on. Automatic reset is normally selected to control the operation when the fault condition is automatically removed or the DS160 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 DOUBLE indicator comes on. After the fault condition is corrected, the RESET contact must be momentarily activated to bring the relay back to the NO DOUBLE state.

## INDICATORS

The function of the indicators and controls on the DS160 are described in the following paragraphs:

1. DOUBLE indicator is ON whenever the received signal is closer to the calibrated value for double thickness than to the calibrated value for single thickness.
2. NO DOUBLE indicator is ON whenever the received signal is closer to the calibrated single thickness value than to the calibrated double thickness value.
3. Both indicators flashing in unison indicates an invalid calibration.

See TROUBLESHOOTING for interpretation of other flash patterns on these indicators.

## CONFIGURATION SWITCHES AND JUMPERS

Two small switches are located at the front of the main circuit board in the opening between the two connectors. Only Switch 1 (left) affects the operation of the unit.

Switch	State	Effect
LEFT	UP	Select 25 kHz Operating Frequency
LEFT	DOWN	Select 6 kHz Operating Frequency
RIGHT	UP	No effect
RIGHT	DOWN	No effect

## **CALIBRATION**

The DS160 controller offers two modes of calibration or “teach”, a one-sample calibration and a two-sample calibration. Both are invoked through the pushbutton on the face of the unit.

The latest calibration information is always stored in non-volatile memory and is restored at power-up.

### **One-sample Calibration**

The one-sample calibration simply sets the gauge threshold at 125% of the signal present at the time the pushbutton switch is pressed.

1. Position the sensor and the object to be sensed in relation to each other to produce an “acceptable” condition.
2. Tap the calibration pushbutton.

If the calibration is successful, the green indicator flashes several times at a 5 Hz rate and then reverts to following the output. The new calibration value is stored in non-volatile memory. If the sensor signal is out of calibration range, both indicators flash simultaneously for 30 seconds or until the calibrate pushbutton is pressed again.

### **Two-sample Calibration**

Two-sample calibration may be used for looser or tighter control of the positioning of the gauge threshold. Two-sample calibration places the gauge threshold at the midpoint between the two recorded samples. Whereas the one-sample calibration always discriminates on a 25% change in signal relative to the sample point, the separation of sample points in the two-sample mode may vary according to the user’s needs.

1. Position the sensor and the object to be sensed in relation to each other to produce an “acceptable” condition.
2. Tap the calibration pushbutton twice within one second. The double indicator begins to flash.
3. Position the sensor and an out-of-tolerance object in relation to each other to produce an “unacceptable” condition.
4. Tap the calibration pushbutton once more. The double indicator stops flashing.

## **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 pushbutton in as power is applied to the unit. The revision number will be displayed as one second flashes of the NO DOUBLE LED for the integer digit followed by one second flashes of the DOUBLE LED for the fractional digit. Count the number of flashes on each LED to determine the revision number. Thus one flash of the NO DOUBLE LED followed by two flashes of the DOUBLE LED indicates version 1.2 of the firmware.

## **POWER REQUIREMENTS**

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

## **OUTPUT RELAY SPECIFICATIONS**

Maximum switched voltage:	380VAC
Maximum switched current:	14 amps N.O., 5 amps N.C., AC resistive, 8 amps DC
Maximum switched power:	200W DC, 2,000VA AC
Minimum required contact load:	12V, 100 mA
Expected mechanical life:	20 million operations
Expected electrical life:	100,000 operations at 8 amps, 240VAC 50,000 operations at 14 amps N.O., 5 amps N.C., 120VAC resistive 30,000 operations at 7.2FLA, 45LRA, 120VAC 10,000 operations at 5FLA, 30 LRA, 240VAC

## **TROUBLESHOOTING**

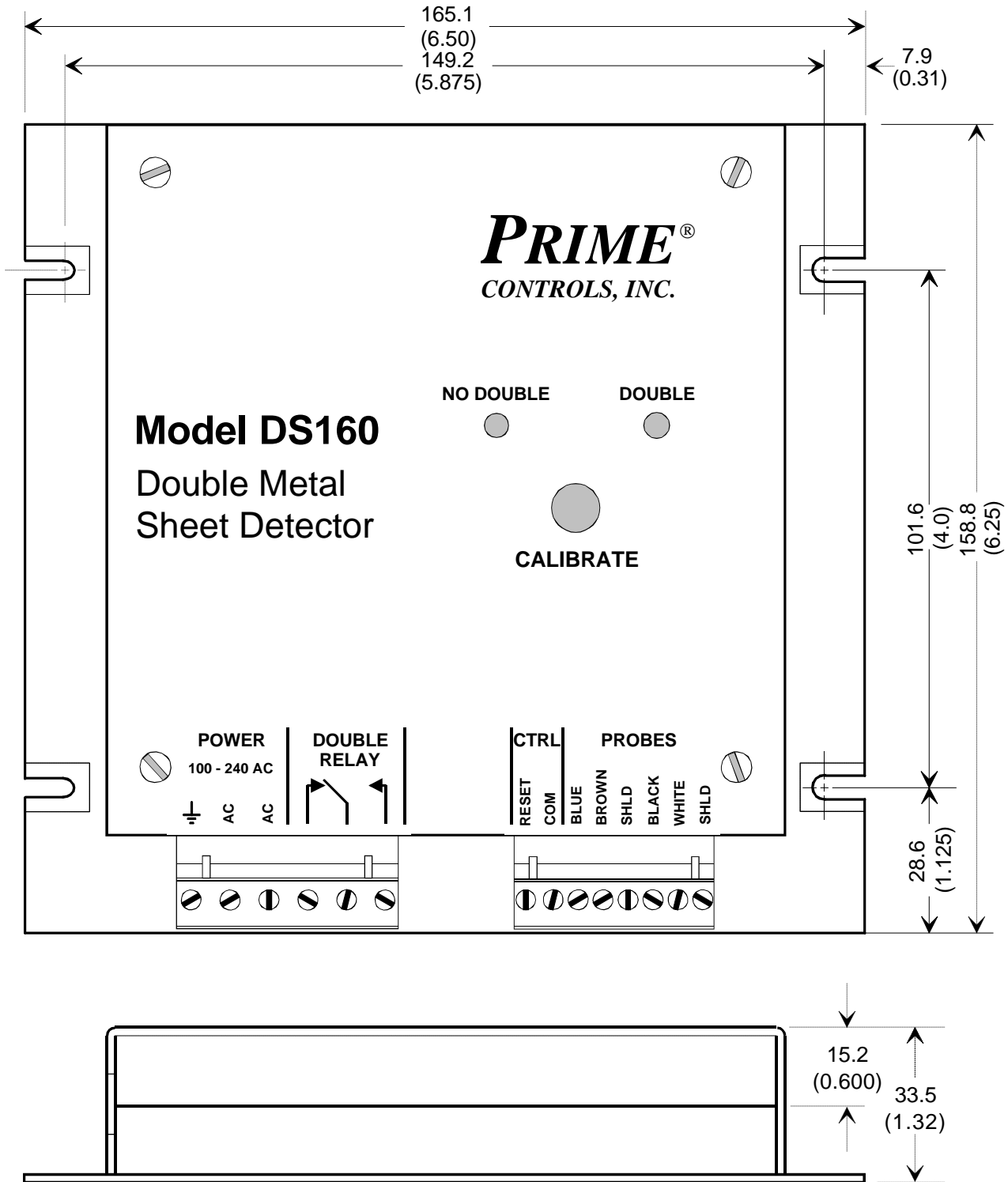
Should trouble develop, proceed as follows:

1. Check AC input power to the control module
2. If the unit powers up, initializes and the indicators show a response to the materials in the gap but the relays do not switch, check 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.
3. If both indicators flash in unison, the system is indicating an invalid calibration. The causes can be many. Among them:
  - an attempt to calibrate both double and single on the same thickness material
  - shorted receiver probe
  - probe gap too large
  - incorrect probes for the material being gauged

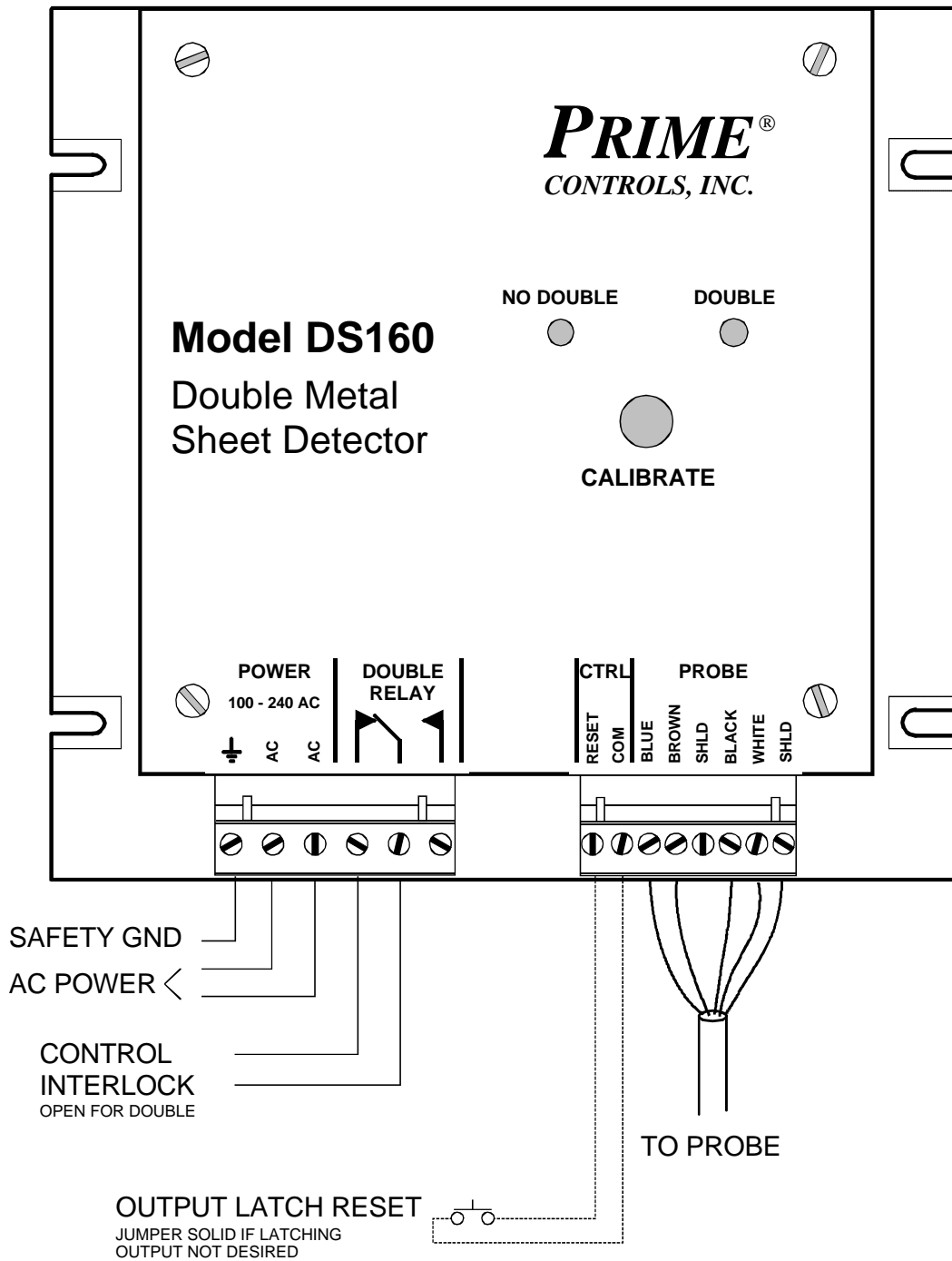
If the problem cannot be resolved, call the factory for assistance.

For further information or service assistance, contact Prime Controls, Inc., 4551 Gateway Circle, Dayton, Ohio. Phone: (937) 435-8659. Mention model number and serial number.

# CONTROL MODULE DIMENSIONS



# DS160 WIRING



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