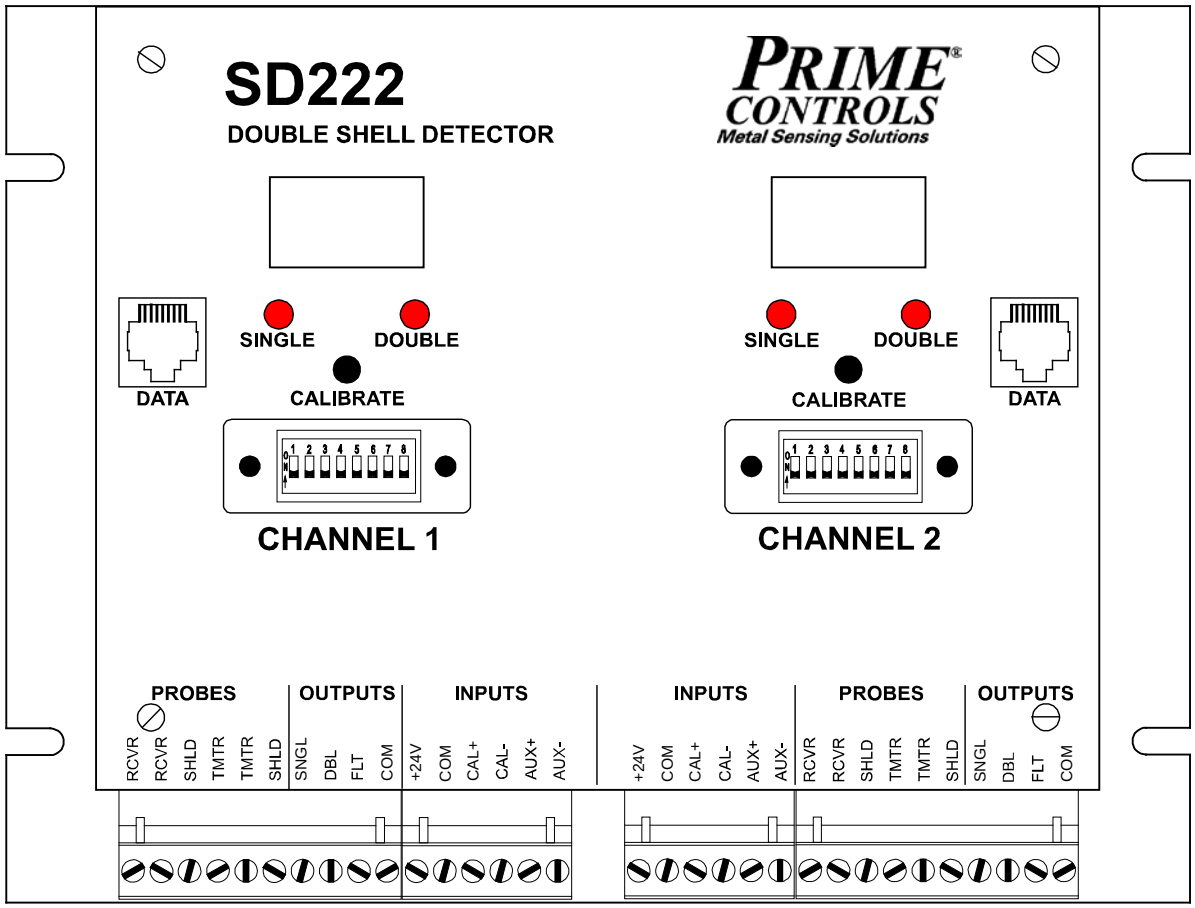
OPERATING INSTRUCTIONS

MODEL **SD222** SHELL DETECTOR



DESCRIPTION

The Model SD222 Shell Detector is a rugged but sensitive dual channel instrument designed specifically to detect and report missing blanks or double blanks either while captive on the belt at the infeed of a conversion press or while free-flowing down a chute after a curler or liner.

A complete system for two lanes of double detection comprises one control module housed in an aluminum enclosure and four probes. Each transmitting and receiving probe pair senses missing blanks or double blanks at one lane of a press or double ends in a chute following a liner or curler.

July 2, 2012

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Control Module

The control module allows for fast and easy setup and for quick diagnosis of system errors or problems. Calibration is achieved through the simple press of a push-button switch or an external contact closure. Faults are reported on digital displays on the control module and through FAULT outputs that may be connected to a PLC or system controller.

The DOUBLE, SINGLE, and FLT outputs may be switch selected as sinking or sourcing drivers. An eight position DIP switch, accessible on the front panel, allows the installer to select a number of operational options as described in the installation section of this document.

The AUX inputs provide a means to switch between sensing steel blanks and sensing aluminum blanks without recalibrating or changing the DIP switch settings.

When the unit first powers up, if probes are properly connected, the digital displays indicate the material sensing mode of the unit, i.e. whether set up for sensing **Al**uminum or **St**eel by displaying the characters "**Al**" or "**St**" for a period of approximately two seconds. Which mode comes up is a function of the setup of the unit through the DIP switches and the state of the AUX inputs as described later in this document.

The SD222 offers two sensing modes that differ in timing characteristics. These modes are selectable through a DIP switch (SW2) setting. On-press operation incorporates delays in the output signals that insure sufficient OFF time between ends to allow PLC detection of the gap between ends during belt indexing. The alternate high-speed mode provides for fast detection of continuously moving ends and provides a minimum output pulse width of 25 milliseconds on the double output when a double is detected. The 25 milliseconds is intended to provide a signal duration that can be detected by a slow PLC or that is of sufficient duration to latch a relay.

In the high speed mode, another feature of the SD222 may be enabled (SW6 on) that ignores partial overlap (shingling) of two ends. I.e. a double is not reported unless the overlap of two consecutive ends exceeds a specified percentage which can be adjusted through the front panel switch. See the section immediately below for details on changing the overlap tolerance. See High Speed Sensing Mode later in this document.

Calibrate Pushbutton Operation

The push-button switches on the front panel of the control module serve to initiate the calibration process and to make adjustments for system setup. The pushbuttons may be used to adjust the gauge tolerances (**tL**), to adjust the overlap tolerance (**oL**) of shingled ends, and to set the display option (**do**) to invert the digital display.

To initiate calibration, simply press the appropriate pushbutton and release it within 3 seconds.

To view the current value of a parameter, press the pushbutton and hold it for more than 3 seconds until the appropriate parameter identifier (**tL**, **oL**, or **do**) appears on the digital display. After the parameter identifier appears, release the pushbutton 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 to displaying the gauge signal.

To change the value of a parameter, press the pushbutton 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 pushbutton and the current value of the parameter displays. Press the pushbutton 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 pushbutton 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 to displaying signal strength.

Probes

The SD222 may be used with any of the two wire probes or with older model three wire probes including AV, AY, AZ, AZA, CB and P15CB probes. When used with older 3 wire probes, the white wire in the probe cable is not used and must remain disconnected.

OPERATION

Operation of the SD222 Shell Detector involves only two processes, calibration and fault interpretation. These processes are described below.

On-Press Calibration

On-press calibration requires the following steps:

1. Stop the press in the dwell portion of the cycle with a single end between the infeed probes.

2. Observe that no error conditions are being reported on either display of the SD222 control module.

3. Press the CALIBRATE pushbutton on the infeed side of the SD220 control module and observe the SINGLE and DOUBLE LEDs flashing alternately and "**CAL**" on the digital display. If the calibration is successful, the LED flashing stops in less than three seconds and the digital display shows a number between 48 and 52.

   If the display flashes alternately "**CAL**" and "**Lo**", the calibration was unsuccessful due to insufficient signal at the receiving probe. This can be an indication that the probes are too far apart or that the unit is not set to the appropriate frequency for the material being sensed, e.g. frequency set to aluminum when steel ends are present. If the display flashes alternately "**CAL**" and "**Hi**", the receiver signal is too strong indicating nothing between the probes.

If the calibration problem is not resolved and the calibration switch is not pressed again within 30 seconds, calibration mode is aborted and the previous calibration values are reinstated.

4. Repeat step 3 on Channel 2 of the SD222.

If both channels calibrate successfully, calibration is complete. The calibration process may also be initiated through an external switch or signal controlling the CAL+ and CAL- inputs to the SD222. Activation of this input performs the same function as pressing the CALIBRATE push-button switch for the corresponding channel.

---------- NOTE ----------

If SW4 is on allowing the thresholds to be adjusted through the front panel, it is imperative that the tolerance parameter (**tL**) be adjusted to an acceptable value. Factory setting is 35. Also, for SD222 units used in high-speed mode with the end overlap feature, the overlap tolerance (**oL**) must be set to a reasonable value, say 30 to 50 percent.

Off-Press Calibration

Off-press calibration applies to applications where the double detection of rapidly moving ends is required such as at the discharge of a curler. The probes are mounted above and below the track with the ends passing between them. Calibration is performed as follows:

1. Observe that no error conditions are being reported on the display of the channel being calibrated.
2. Place a single shell between the probes and press the CALIBRATE pushbutton. The SINGLE and DOUBLE LEDs flash alternately and "**CAL**" appears on the digital display. If the calibration is successful, the LED flashing stops in less than three seconds and the digital display shows a number between 48 and 52.

   If the display flashes alternately "**CAL**" and "**Lo**", the calibration was unsuccessful due to insufficient signal at the receiving probe. This can be an indication that the probes are too far apart or that the unit is not set to the appropriate frequency for the material being sensed, e.g. frequency set to aluminum when steel ends are present. If the display flashes alternately "**CAL**" and "**Hi**", the receiver signal is too strong indicating nothing between the probes.

   If the calibration problem is not resolved and the calibration switch is not pressed again within 30 seconds, calibration mode is aborted and the previous calibration values are reinstated.

3. If calibration is successful, the LED flashing stops in less than three seconds and the digital display shows a number between 48 and 52. Calibration is complete.

Fault Message Interpretation

The SD222 monitors the probe connections on a continuous basis and reports what it detects to be disconnected or malfunctioning probes. The probe faults are reported as follows:

Alternately flashing "**PR**" and "**1**" - transmitter probe disconnected or failing.

Alternately flashing "**PR**" and "**2**" - receiver probe disconnected or failing.

Alternately flashing "**PR**" and "**3**" - both probes disconnected or failing

During calibration:

Alternately flashing "**CAL**" and "**Lo**" indicates a low signal at the receiving probe.

Alternately flashing "**CAL**" and "**Hi**" indicates the signal at the receiver is too strong, likely no end between the probes.

The SD222 performs extensive self diagnostics at power up and more limited diagnostics while running. Most fatal faults, if not involving the display subsystem, are reported on the digital displays through the alternate flashing of "**Err**" and "**nnn**" where "**nnn**" is a one to three digit number indicating the source of the fault. These faults are not field repairable and require the change out of the control module.

Any detected fault relating to channel 1 causes the channel 1 FLT output to be turned OFF until the fault is cleared. Any channel 2 fault causes the channel 2 FLT output to be turned OFF until the fault is cleared.

INSTALLATION

Installation comprises four basic steps: 1) installing the probes, 2) mounting the control module, 3) wiring the unit, and 4) setting system options. Each of these steps is further expanded below.

Installing the Probes

1. Mount the probes, one above and one below the centerline of the track that carries the ends into a press or out of a curler or liner. For on-press applications the probes must be positioned such that they are *centered on the can end during the dwell* portion of the press cycle. In the vertical, the track should run midway through a gap of approximately 5/8 inch (16 mm) between the probes. For off-press applications the probes should be centered on the pass-line of the moving ends.

2. Run the probe cabling through conduit back to the cabinet housing the control module. *Do not run the sensor cables through conduit carrying high level or noisy signals.*

Mounting the Control Module

Mount the control module on the back panel of an industrial enclosure. The footprint is 8.25 inches (210 mm) by 6.25 inches (159 mm) with mounting slot locations on a rectangle 7.625 inches (194 mm) in the horizontal and 4.0 inches (102 mm) in the vertical. Insure that the mounting screws make good electrical contact between the module housing and the control enclosure back panel. See drawing at the end of this document.

Wiring the Control Module

1. Connect 24 volt dc power between one set of the +24V and COM terminals of the control module. Two +24V terminals and two COM terminals are supplied for convenience of connecting jumpers to the CAL and AUX inputs. The two +24V terminals are internally connected. The supply must be capable of delivering 0.2 amps continuous and a startup surge of 0.5 amps for 2 milliseconds.

2. Connect the channel 1 transmitter probe wires to the two TMTR terminals on the left side of the control module and the channel 1 receiving probe wires to the two RCVR terminals on the left side of the control module. The probe connections are not polarized. Connect the shield wires to the terminal labeled SHLD.

   Though both the transmitting and receiving probes are identical, it is preferred practice to choose the transmitting probe as the one that will remain farthest from the ends as they pass between the probes.

   On retrofit installations where older three wire probes are installed, cut back and do not connect the third (usually white) wire. If in doubt about which wires to use, measure the resistance between the wires in pairs, and then use the pair that produces the highest resistance reading (typically 24 ohms).

3. Repeat step 2 for channel 2 of the unit.

4. Connect the SNGL, DBL, and FLT outputs to the system controller and/or interlocking circuitry as required. These outputs may be sinking or sourcing as determined by the setting of SW5 (off for sourcing, on for sinking).

   The FLT outputs are always ON for no fault and the outputs operate independently. Thus a probe fault on channel 1 will not be reported on channel 2 and vice versa. The active states of the other outputs may be affected by the setting of the compatibility switch (SW3) as described later in this document.

5. If calibration is to be activated remotely, connect the CAL+ and CAL- inputs appropriately. Connect *sinking* drivers or contacts to the CAL- terminal and connect CAL+ to the 24 volt power source. Connect *sourcing* drivers to the CAL+ terminal and connect CAL- to COM.

6. If the application may involve switching between steel and aluminum blanks, either AUX input may be wired to provide external control of the sensing mode of the SD222. Connect *sinking* drivers or contacts to the AUX- terminal and connect the AUX+ terminal to the 24 volt supply. Connect s*ourcing* drivers to the AUX+ terminal and connect the AUX- terminal to COM.

Setting Switch Options

To access the DIP switches in the middle of the front panel, swing the hinged plastic window to the side. The left-most switch is SW1, the right-most is SW8. The switches are on when in the up position.

Switch options for channel1 and channel 2:

Switch	OFF	ON
SW1	Sense aluminum ends	Sense steel ends
SW2	On-press sensing	Off-press sensing (high speed)
SW3	Select fail-safe mode	Select compatibility mode
SW4	Fixed thresholds	Adjustable thresholds
SW5	Sourcing outputs	Sinking outputs
SW6	No overlap allowed	Overlap allowed if SW2 ON
SW7	Not used	
SW8	Not used	

---------- NOTE ----------

The DIP switches are read only upon power-up of the unit. After changing a switch setting, power the unit down and back up again to activate the change.

Sensing Aluminum Ends

When sensing aluminum shells, insure that SW1 is off. Note that if the AUX input is activated and SW1 is off, the unit is set to sense steel ends. See “Quick Calibration Changeover” later in this document.

Sensing Steel Ends

When sensing steel shells, insure that SW1 is on. Note that if the AUX input is activated and SW1 is on, the unit is set to sense aluminum ends. See “Quick Calibration Changeover” later in this document.

Set Sinking or Sourcing Outputs

The setting of SW5 determines whether the output drivers are sinking or sourcing. SW5 off selects sourcing, SW5 on selects sinking.

Set Outputs for Failsafe or Compatibility

When SW3 is on, the sourcing outputs of the SD220 provide the same logic levels as the outputs of older double sheet units such as the DS33 and DS35, allowing for quick and easy retrofit installations. When SW3 is OFF, the output states are defined to provide maximum protection against loss of connection between the shell detector and the controlling PLC. The loss of connection is sensed as the fault condition.

The table below defines the output states for all combinations of SW3 and the possible sensing states. For further clarification see the signal drawings at the end of this document.

		Ch 1 OUTPUT STATES		Ch 2	
Switch	In Gap	SNGL	DBL	SNGL	DBL
OFF	missing	OFF	ON	OFF	ON
OFF	single	ON	ON	ON	ON
OFF	double	ON	OFF	ON	OFF
ON	missing	ON	OFF	ON	OFF
ON	single	OFF	OFF	OFF	OFF
ON	double	OFF	ON	OFF	ON

Setting Options Through the Front Panel

Adjusting the Tolerance

If SW4 is on, the gauging tolerance may be adjusted by following the six steps below. The tolerance sets the threshold below which the received signal is considered a double. The threshold is computed as:

Threshold = cal value – (cal value x tolerance).

Thus if the displayed value after calibration is 50 and the tolerance is set to 35%, the threshold is set to 32.5 = 50 – (50 x 0.35). Follow these steps to set the tolerance:

1) Insure that SW4 is on. If necessary, change the switch position and power the unit down and back up..

2) Press and hold the calibrate pushbutton for at least 3 seconds until **tL** appears on the display.
3) Release the pushbutton and observe the current value of the threshold (in percent).
4) If the current value is ok (typically 35), wait 5 seconds and the display reverts to displaying the gauge value and retains the current tolerance.
5) To change the value, press and hold or tap the calibration pushbutton until the desired value is displayed. After the value reaches 90, it rolls over to 10 and increases.
6) When the desired value is on the display, wait 5 seconds and the display reverts to displaying the gauge value and retains the last displayed tolerance value.

Setting Overlap Percentage

If SW2 and SW6 are on, the overlap percentage may be set through the front panel as follows:

1) Insure that SW2 and SW6 are on. If necessary, change the switch positions and power the unit down and back up..
2) Press and hold the calibrate pushbutton for at least 3 seconds until **oL** appears on the display.
3) Release the pushbutton and observe the current value of the overlap allowance (in percent).
4) If the current value is ok (typically 35 to 50), wait 5 seconds and the display reverts to displaying the gauge value and retains the current tolerance.
5) To change the value, press and hold or tap the calibration pushbutton until the desired value is displayed. After the value reaches 90, it rolls over to 0 and increases.
6) When the desired value is on the display, wait 5 seconds and the display reverts to displaying the gauge value and retains the last displayed overlap percentage value.

Setting Display Direction

By default, the digital display values follow the strength of the receiver signal, increasing for stronger signal and decreasing for weaker signal. In this mode, the signal increases for thinner materials between the probes and decreases for thicker materials. The display may be inverted so that the values are proportional to material thickness rather than signal strength. To invert the display:

1) Press and hold the calibrate pushbutton until **do** appears on the display.
2) Release the pushbutton and the display changes to **0** or **1**.
3) At this point, with each press of the pushbutton the display toggles between **0** and **1**. The **0** selects normal display mode, **1** selects inverted mode..

4) When the desired value is on the display, wait 5 seconds and the display reverts to displaying the signal value in the selected mode.

Parameter Value Ranges

ID	Function	Range of Values
do	display direction	**0** for signal strength (default), **1** relative thickness
tL	double tolerance	10% to 90% for double (default is 35%)
tL	tab tolerance	10% to 90% for tab (default is 15%)
oL	overlap percentage	0% to 90% for off-press sensing only (SW2 On)

Special Functions

Remote Calibration

The SD222 offers an optically isolated input on each channel that allows the function of the CALIBRATE pushbutton to be wired to a remote pushbutton switch or controller. The remote calibration inputs, when activated, perform the same function as the CALIBRATE push-button switches on the front panel of the control module.

If calibration is to be activated remotely, connect the CAL+ and CAL- inputs appropriately. Connect *sinking* drivers or contacts to the CAL- terminal and connect CAL+ to the 24 volt power source. Connect *sourcing* drivers to the CAL+ terminal and connect CAL- to COM.

Quick Calibration Changeover

The AUX inputs work in conjunction with SW1 to determine the sensing mode (sensing steel or aluminum shells) of the SD222. Activating the AUX input reverses the effect of SW1.

If SW1 is OFF and the AUX input is not active, aluminum sensing is selected. With SW1 OFF and the AUX input active, steel sensing is selected. If SW1 is ON and the AUX input is not active, steel sensing is selected. When SW1 is ON and the AUX input is active, aluminum sensing is selected.

As the SD222 changes modes from sensing aluminum to sensing steel, the characters "**St**" appear on the two digit displays for a period of approximately 2 seconds indicating the switch to steel shell sensing. Likewise, when switching from steel sensing mode to aluminum sensing mode, the characters "**Al**" appear on the two digit displays indicating the switch to aluminum shell sensing.

If quick calibration changeover is to be activated remotely, connect the AUX+ and AUX- inputs appropriately. Connect *sinking* drivers or contacts to the AUX- terminal and connect AUX+ to the 24 volt power source. Connect *sourcing* drivers to the AUX+ terminal and connect AUX- to COM.

High Speed Sensing Mode without Overlap Allowance

SD222 units offer two sensing modes that differ in timing characteristics. These modes are selectable through the setting of SW2. SW2 off selects on-press operation which incorporates delays in the output signals that insure sufficient off time between ends to allow PLC detection of the gap between ends during belt indexing.

SW2 on selects the alternate high speed mode which provides for fast detection of continuously moving ends and provides a minimum output pulse width of 25 mS on the double output when a double is detected. The 25 mS is intended to provide a signal duration that can be detected by a slow PLC or that is of sufficient duration to latch a relay.

In the high speed sensing mode, minimum sensing time is approximately 3 milliseconds. This means that the end must completely block the sensor gap for a minimum of 3.5 milliseconds.

High Speed Sensing Mode with Overlap Allowance

The SD222 is capable of discriminating between double shells and overlapping ends (shingling). The percentage of overlap to be tolerated (**oL**) is set by the user through the front panel. See Calibrate Pushbutton Operation towards the beginning of this document. The overlap tolerance represents the percentage of the total end travel time that is seen as double. Thus if the ends were overlapped halfway, the double percentage would be 33 (1/3 of the total). If the tolerance is set to 30, the 33 percent overlap would be reported as a double. Since the two channels of the SD222 are independent, the overlap percentage must be set on both channels.

When the overlap allowance option is in effect, the occurrence of a double is reported on the DOUBLE output by a 25 millisecond pulse, *after* the end has completely cleared the sensors. Since the total end must be sensed to determine the percentage of overlap, the decision and reporting of doubles necessarily occurs after the end has moved past the sensors. Consequently, the double LED and double output do not come on when a double is statically placed between the probes. The output and double LED pulse on once as the double end exits the probe gap. See the output waveforms later in this document.

Determining Firmware Version

From time to time, as improvements are made to Prime Controls 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 are of the form 1.00 and are incremented either by tenths (1.01, 1.02, etc.) for small revisions or by the integer digit (1.00, 2.00, etc.) for more significant revisions.

To determine the version of the firmware running in your unit, hold the calibration pushbutton in as power is applied to the unit. The revision number is displayed directly on the digital display.

The two channels of the SD222 are independent and may be running different versions of firmware. Each must be checked separately.

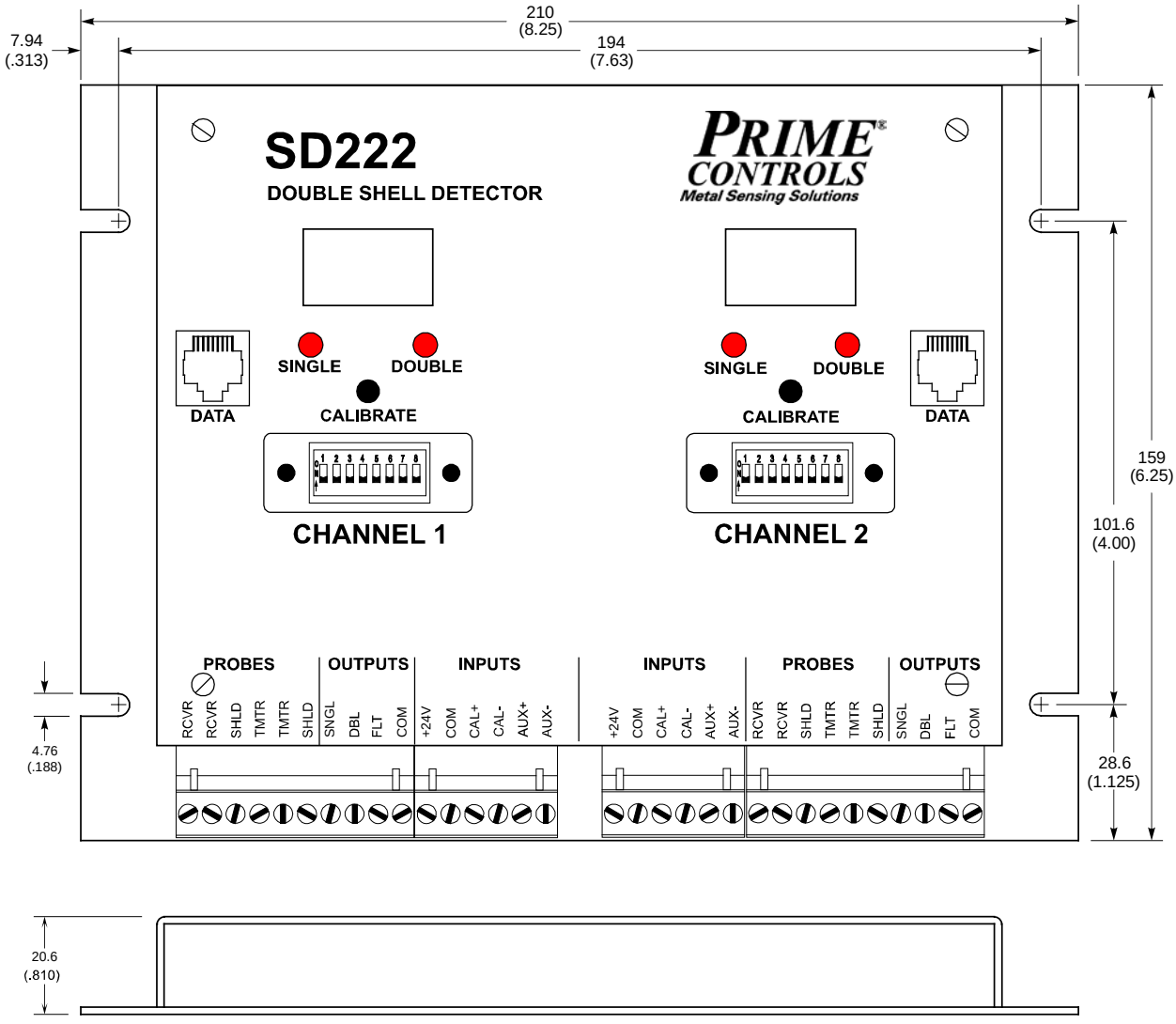
DOCUMENT APPLICABILITY

This document applies to SD222 units running firmware Version 1.01 and 1.02

ELECTRICAL SPECIFICATIONS

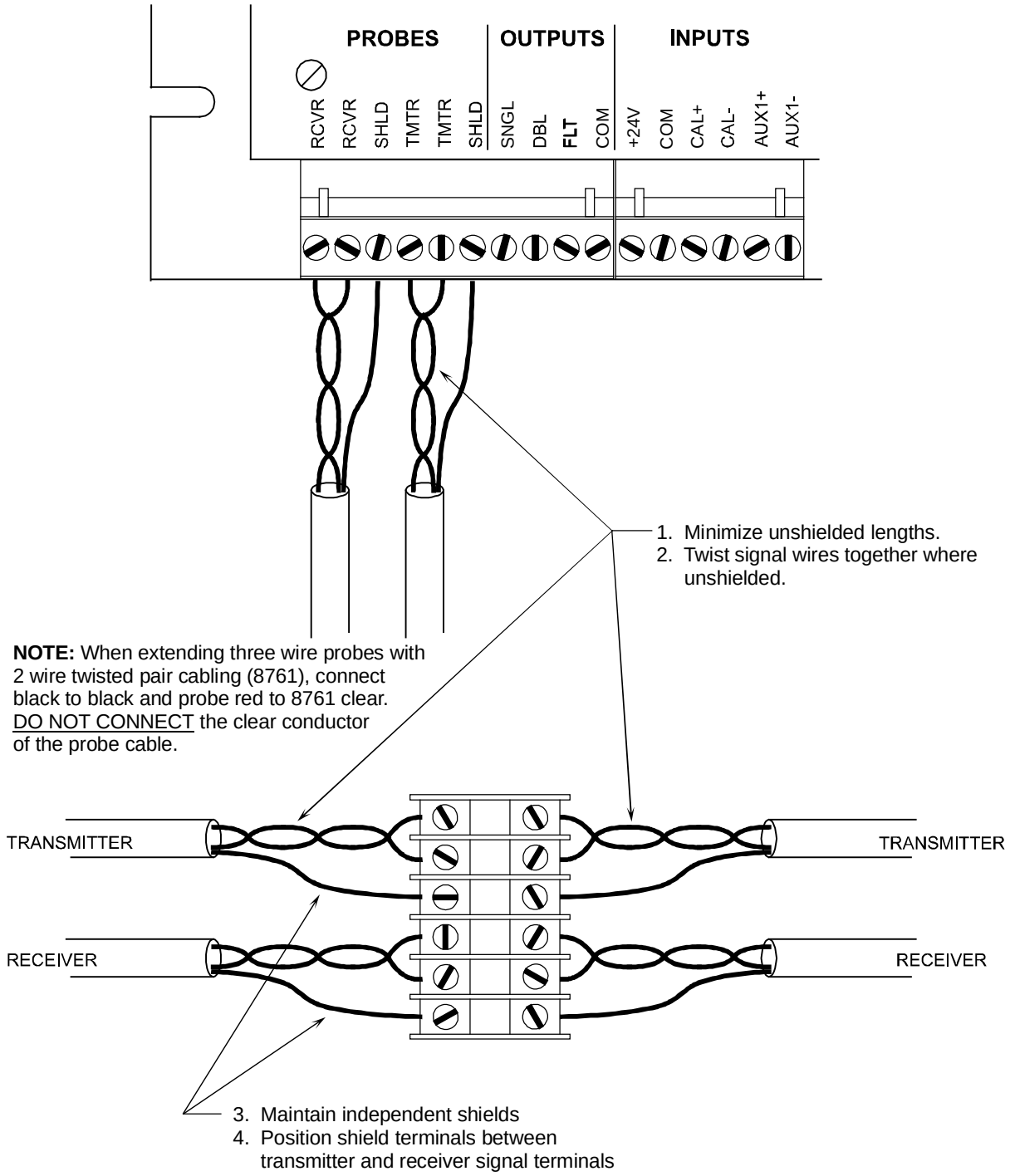
Supply Voltage:	24 volts DC plus or minus 10%
Supply Current per Channel:	130 mA plus sourcing output load
Inrush Current at Startup:	500 mA for 3 milliseconds per channel
AUX and CAL Max Input Voltage:	30V
AUX and CAL input impedance:	3300 ohms
Sourcing Outputs:	On voltage: Supply Voltage – 1.0 volt Off voltage: 0 volts Max current: 50 mA
Sinking Outputs:	On voltage: 0 volts Off voltage: Load pullup dependent Max current: 50 mA
Output Overload Protection:	Self-resetting thermal fuse
Input and Output Transient Protection:	30 volt transient absorber.

SD222 CONTROL MODULE DIMENSIONS



SD222 WIRING RECOMMENDATIONS

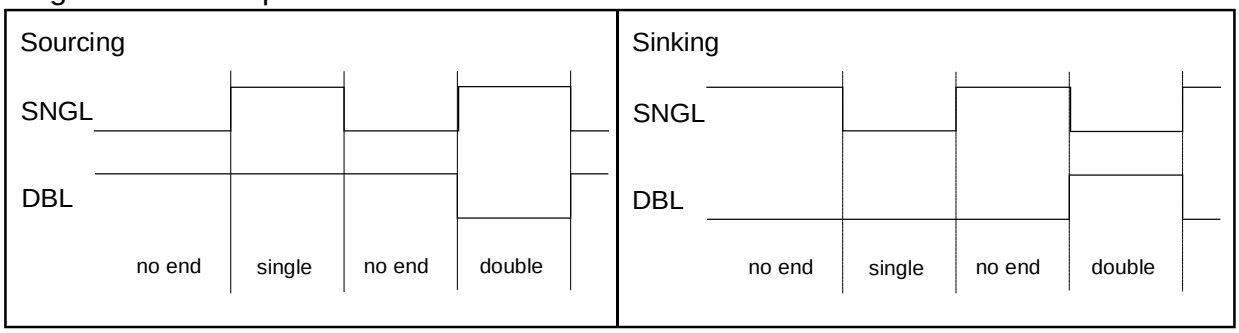
For maximum noise immunity, splice or terminate cables only when absolutely necessary. Where extension is necessary, use Belden 8761 or equivalent shielded twisted pair cable. The SD22x family of products is designed to provide high common mode noise rejection. Common mode rejection is realized most effectively with twisted pair cabling.



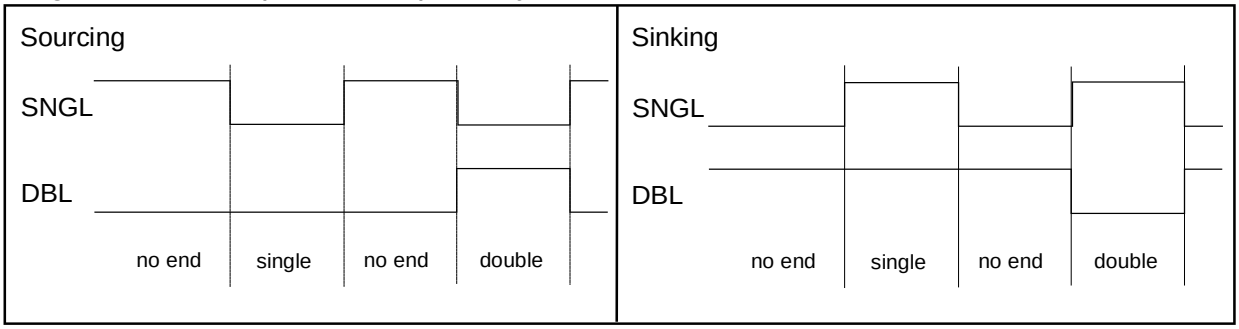
OUTPUT SIGNALS

CHANNEL 1 and CHANNEL 2 - NORMAL MODE

Single/Double Outputs - Failsafe Mode

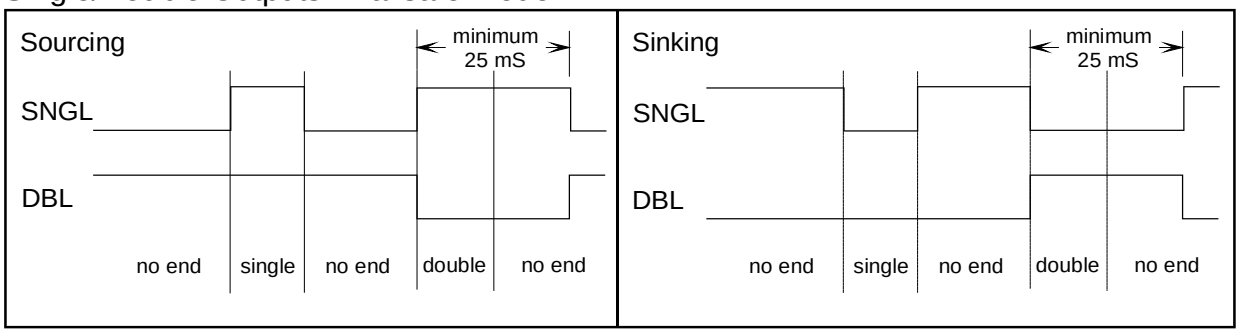


Single/Double Outputs - Compatibility Mode

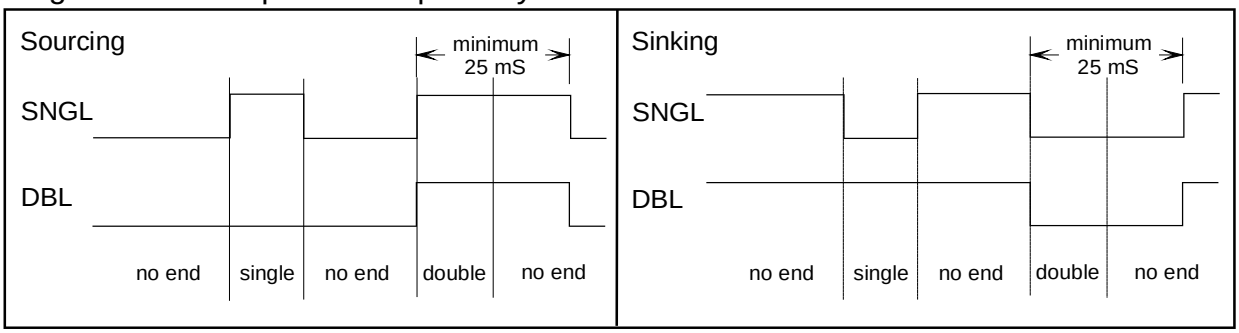


CHANNEL 1 and CHANNEL 2 - HIGH SPEED MODE

Single/Double Outputs - Failsafe Mode

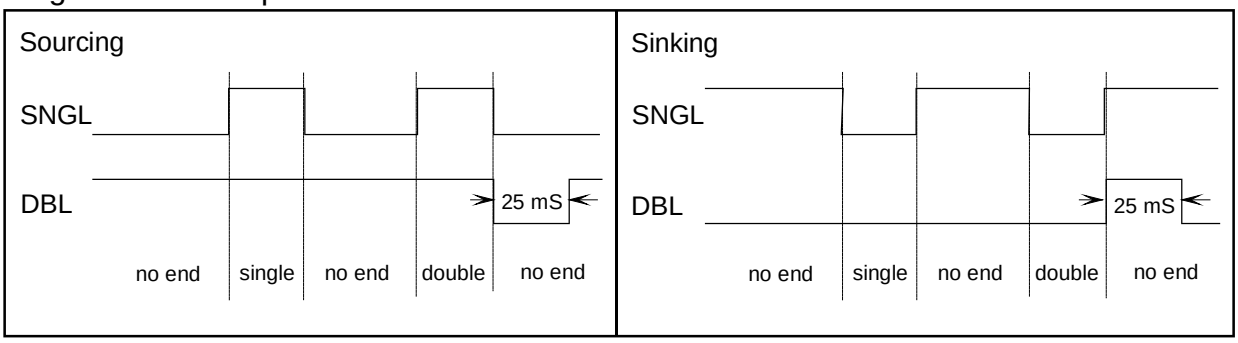


Single/Double Outputs - Compatibility Mode

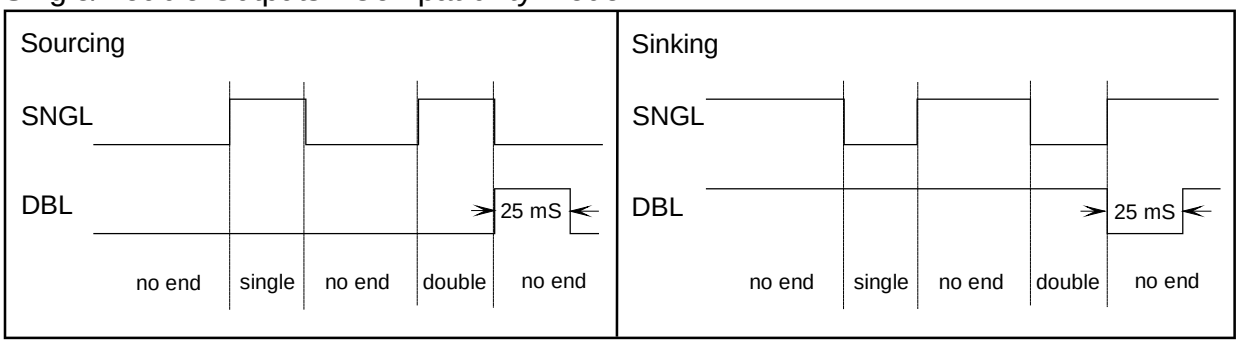


CHANNEL 1 and CHANNEL 2 - HIGH SPEED MODE with OVERLAP ALLOWANCE

Single/Double Outputs - Failsafe Mode



Single/Double Outputs - Compatibility Mode



SUMMARY OF DIFFERENCES BETWEEN SD202 AND SD222

FEATURE	SD202	SD222
Wiring		
Power connection	+24V and COM to left or right channel	+24V and COM to both channels
AUX input frequency change	AUX inputs are slaved internally	Both AUX inputs must be driven independently
Configuration		
DIP switch access	Remove cover	Window on front panel
Number of configuration switches	Four for both channels	Eight for each channel
Sink/Source select	Jumpers beneath cover	Switch Select
Display inversion	Switch select	Parameter selected
Overlap Allowance Disable	Set **oL** value to zero	Switch 6 off
Data Collection		
Serial port	Not available	Serial port on each channel

SD200 TO SD220 MIGRATION

Replacement of installed SD202 units by SD222s requires the following wiring changes:

1. +24V and COM must be connected to both channels of the SD222.
2. If your installation uses the AUX input to quickly change between calibrations on different shell materials, it is necessary with the SD222 to activate the AUX input on both channels independently. The AUX inputs are not slaved together as in the SD202.

Configuration of the SD222 has been simplified as compared to the SD202. It is no longer necessary to remove the cover to change options. These changes include:

1. The DIP switches, now eight per channel instead of four per unit, are accessible through a window on the front panel.

2. Where the SD202 requires jumper changes under the front panel to select sinking or sourcing outputs, the selection on the SD222 is made through the setting of SW5. Set SW5 off for sourcing and on for sinking.

The method of setting some options has changed. The list below shows which settings remain the same and which have changed:

Configuration Switches – Both Channels

1. SW1 – (no change) – configures the unit for aluminum or steel ends.
2. SW2 – (change) – no longer inverts display, selects off-press sensing.
3. SW3 – (no change) – selects output failsafe or compatibility mode.
4. SW4 – (no change) – selects fixed thresholds or adjustable thresholds.
5. SW5 – (new) – selects sourcing or sinking outputs.
6. SW6 – (new) – allows or disallows overlap discrimination (for shingling).
7. SW7 – not used
8. SW8 – not used

SW2 no longer inverts the display as on the SD202; use setup parameter **do** (display option) on the SD222

LIMITATION AND EXCLUSION OF WARRANTIES

All goods purchased from Prime Controls, Inc. shall be free from defects in materials, design and workmanship under normal conditions of use for one year from the date of shipment. THIS WARRANTY IS THE SOLE WARRANTY AND IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR PURPOSE. THE LIABILITY OF PRIME CONTROLS TO ANY PURCHASER SHALL BE LIMITED EXCLUSIVELY TO THE COST OF REPLACEMENT OR REPAIR OF DEFECTIVE PARTS, AND SHALL NOT INCLUDE LIABILITY FOR ANY DIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES WHATSOEVER, WHETHER FORESEEN OR UNFORESEEN, INCLUDING BUT NOT LIMITED TO LOST PROFITS, LOST SALES, OR INJURY TO PERSONS OR PROPERTY. 9/25/97