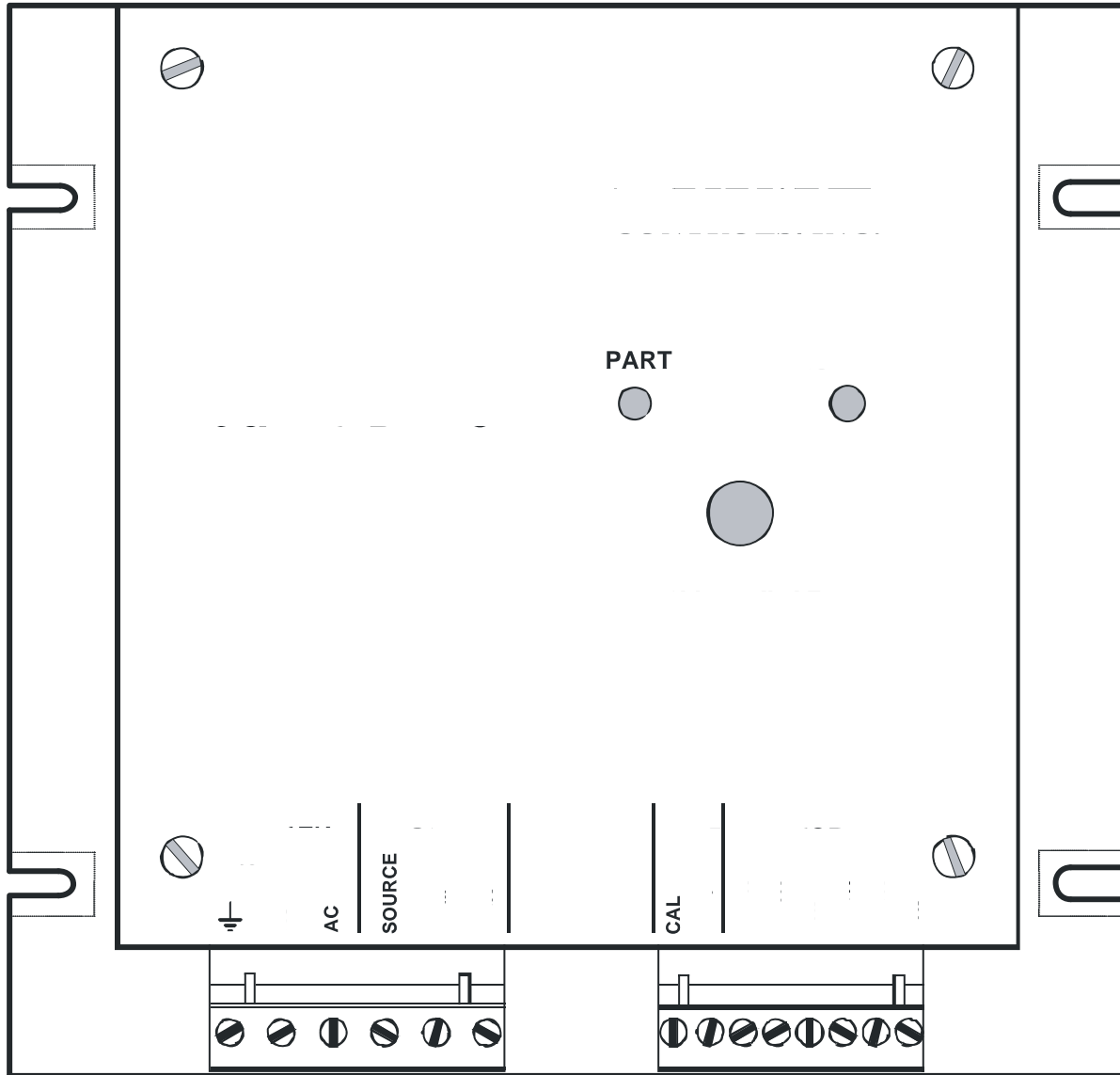


OPERATING INSTRUCTIONS

Model PD150 METAL PART DETECTOR



DESCRIPTION

The Model PD150 Part Detector comprises a control module in a sheet metal housing and two remote probes, forming a system that detects the presence of a metal target between the two probes. For proper detection, the system must be calibrated by first pressing the calibration pushbutton with nothing between the probes and then pressing the pushbutton a second time with a sample of the intended target object centered between the probes. Thereafter, whenever a sample of the target object passes between the probes, the outputs and the green indicator turn on.

Control Module

The control module provides a user interface for fast and easy setup and for diagnosis of system errors or problems. Calibration is achieved through the simple press of a push-button switch. Faults are reported through different flash patterns on the green and yellow “PART” and “NO PART” indicators (See TROUBLESHOOTING).

When the unit first powers up, the two indicators flash alternately as the unit determines the type of probes attached and tunes the operating parameters for your specific installation. This may take up to 10 seconds. If the probes are not recognized, the flash pattern changes to a fixed pattern with the yellow indicator constantly on and the green indicator flashing. When probe assessment has completed successfully, the indicators stop flashing

NOTE: When power is first applied to the PD150, there must be no metal between the probes to allow for proper operating parameter determination..

Other features of the control module include:

- 95 to 130 or 200 to 250 volt operation selected through internal jumpers.
- Removable terminal blocks for quick change out of the control module.
- Both sinking and sourcing outputs.
- LED indicators report the output states of PART or NO PART.
- Automatic setup of system gain and operating parameters.
- Simple push-button calibration.
- Non-volatile memory that retains all calibration parameters even when power is removed.
- Probe fault detection and reporting via the two front panel indicators.
- External Calibrate terminals for convenient placement of the calibrate switch

Probes

The PD150 operates with a several different Prime probes including Models CB, P15CB, P15CS, and P15T18P. All probes are potted and completely sealed. The probes do not respond to small amounts of fine metal filings, oil or dirt.

INSTALLATION

Installation of the individual components of the Part Detector system is covered in the following paragraphs:

PD150 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 6.5 inches (165 mm) by 6.25 inches (159 mm) with mounting slot locations on a rectangle 5.875 inches (149 mm) in the horizontal and 4.0 inches (102 mm) 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.

Probes

The probe must be mounted along a common axis and such that the parts to be detected pass directly between the probes. For maximum separation, use probes with plastic housings such as the P15T18P and mount the probes using non-metallic jam nuts and brackets.

Electrical Wiring

All wiring for the PD150 connects to removable terminal blocks at the bottom of the control enclosure as described in the following paragraphs.

1. Connect 100 to 130 VAC (50-60 Hz. @15watts) to the terminals labeled AC on the left of terminal block. Connect earth ground to the leftmost terminal.
2. For 200 to 260 volt operation remove the PD100 cover and remove suitcase jumpers **A** and **C** immediately in front of the gray transformer block. Place one of the suitcase jumpers in position **B**. Discard the second jumper. Replace the cover. The factory setting for these jumpers is for 100 to 130 volt operation. *Do not power the Model PD100 with 200 to 260 VAC until jumpers have been changed.*
3. The logic output of the PD150 is available at the terminals labeled SINK and SOURCE. The SOURCE output is OFF when no part is detected and sources 24 volts when a part is detected. The SINK output is OFF when no part is detected and switches ON (forms a connection to COM) when a part is detected. During normal gauging operations, the green and yellow indicators reflect the state of these outputs, i.e. when the yellow indicator is ON, the outputs are OFF and when the green indicator is ON the outputs are ON.
4. Run shielded cable from the probe to the board in conduit. The probes are connected to terminals on the rightmost terminal block labeled TMTR, SHLD, RCVR, and SHLD.

Connect the primary conductors from one probe to the terminals labeled TMTR. This probe becomes the transmitter. The probes are the identical; either can be the transmitter or receiver. Connect the primary conductors from the second probe to the terminals labeled RCVR. Connect the shield leads (drain wires) from each probe cable to the terminals labeled SHLD. The probes are non-polarized, thus the order of lead connection is not important. If either cable is spliced between the control and probe leave the cable unshielded no more than 20 to 30 mm and maintain separate shields for both cables.

INPUTS AND CONTROLS

The primary control input to the PD150 is the calibration push-button switch on the front panel. Use of this switch is described below under CALIBRATION.

The PD150 has one logic input labeled CAL. The CAL input parallels the function of the calibrate push-button on the front panel allowing the calibration function to be performed through a remotely located switch wired to this input.

The CAL input has associated with it a jumper plug located under the front cover and immediately behind the CAL terminal. The function of this jumper is to configure the input for sink or source as described below under CONFIGURATION SWITCHES AND JUMPERS.

The CAL input is ON when low (zero volts) independent of the jumper settings.

A two position DIP switch between the two main connectors, is visible from the connector edge of the unit. These switches are for future expansion and currently have no effect on the operation of the unit.

OUTPUTS

The PD150 provides two high speed, solid-state outputs that switch together. The SOURCE output sources current at 24 volts when ON and no current when OFF. The SINK output appears as an open circuit when OFF and forms a connection to COM when ON.

INDICATORS

The function of the indicators and controls on the PD150 are described in the following paragraphs:

1. The amber NO PART indicator is ON whenever no part is detected between the probes.
2. The green PART indicator is ON whenever a metal part is detected between the probes.

Through various flashing patterns, these indicators also provide information regarding system mode (calibrate vs operate), firmware version number, and error conditions. Reading firmware version is described later in this document. All other flash patterns can be interpreted as follows:

Alternate flashing of amber and green indicates busy such as during initialization after power-up.

Simultaneous flashing of amber and green indicates failed parameter setup during startup or failed calibration. This error can occur if the gap between the probe and the target is excessive.

Green off, amber flashing – calibrating empty gap.

Green flashing, amber off – awaiting second pushbutton press during calibration.

Green on, amber flashing – transmitter probe error. Probe may not be connected, probe wire broken or probe may be defective.

Green flashing, amber on – receiver probe error. Probe may not be connected, probe wire broken, or probe may be defective.

CONFIGURATION SWITCHES AND JUMPERS

A two position DIP switch is located under the cover on the main control circuit board in the opening between the two connectors. These switches are for future expansion and currently have no effect on the operation of the PD100.

The CAL input has associated with it a two position jumper plug located under the front cover and immediately behind the connector. This jumper allows the input 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 (factory setting), the input is set up for a sinking driver, or dry contact between the input and COM. The input is always active low.

CALIBRATION

The detector may be calibrated via the push-button switch on the front cover or remotely through a switch connected between the CAL and COM terminals of the right terminal block.

In calibrating, the objective is to establish and record a signal threshold that discriminates a part present condition from a no part present condition. Thus, to establish the threshold position, simply insure nothing is in the gap between the probes and press the CALIBRATE push button on the front panel of the PD150 or a remote pushbutton wired into the CAL input. The PART indicator flashes as the unit awaits a second press of the CAL pushbutton. Place a sample of the part to be detected in the gap between the probes and again press the appropriate CAL pushbutton. Calibration is complete.

If calibration is not successful, both indicators flash in unison for 30 seconds or until the CAL pushbutton is pressed for another attempt at calibration. If, after 30 seconds, no attempt is made to calibrate, the unit reverts back to the calibration settings that were in effect prior to the unsuccessful calibration.

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 is displayed as one second flashes of the green LED for the integer digit followed by one second flashes of the amber LED for the fractional digit. Count the number of flashes on each LED to determine the revision number. Thus one flash of the green followed by two flashes of the amber LED indicates version 1.2 of the firmware.

ELECTRICAL SPECIFICATIONS

Power Requirements

95 to 130 volts, 50/60 Hz at 50 mA with jumpers A and C installed.

190 to 260 volts, 50/60 Hz at 25 mA with jumper B installed.

Logic Input Electrical Specifications

Maximum Input Voltage:	30 Volts
Pull-up voltage level:	15 volts through 4700 ohms
Upper switch threshold:	6.9 volts
Lower switch threshold:	3.3 volts

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

Logic Output Electrical Specifications

Sinking Output

Open Drain Connection:	Labeled SINK
Max. applied voltage:	30 Volts, TVS limited
Max. current, momentary:	40 Amps
Max. current, sustained:	50 mA, fuse limited
Max. off state leakage @ 50 V:	25 uA
Overcurrent protection:	Self resetting fuse.
ESD protection:	Transient Voltage Suppressor @ 30 Volts

Sourcing Output

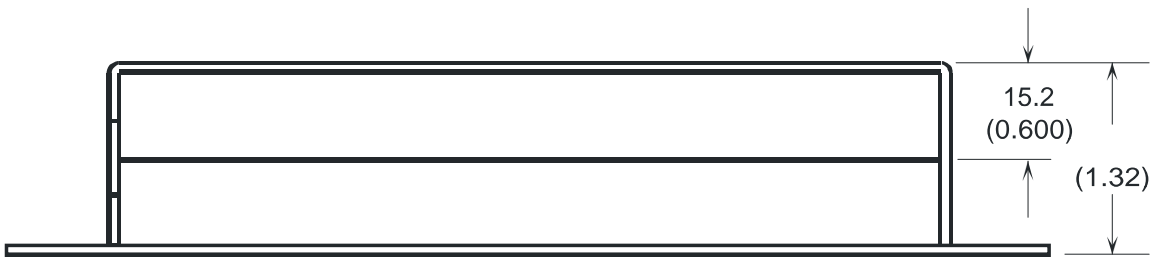
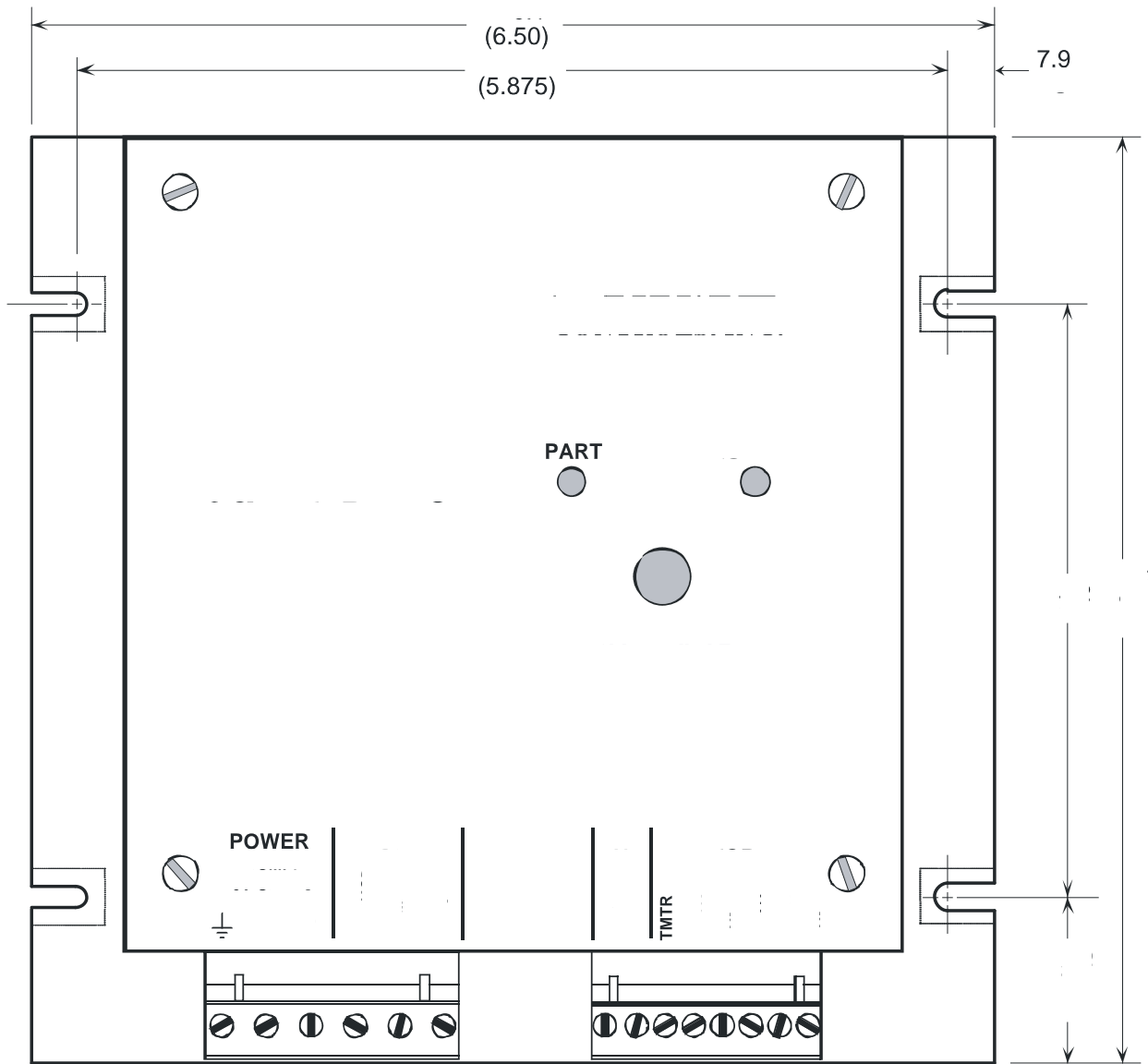
Connection:	Labeled SOURCE
Max. source current:	50 mA, fuse limited
Output Voltage High:	24 volts, nominally
Overcurrent protection:	Self resetting fuse
ESD protection:	Transient Voltage Suppressor @ 30 Volts

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 PD150 housing.
1. If the NO PART indicator is on solidly while the PART indicator is flashing, check for a missing, disconnected, open, or shorted transmitter probe.
2. If the PART indicator is on solidly while the NO PART indicator is flashing, check for a missing, disconnected, or open receiver probe.
3. If at power-up the PART indicator flashes constantly while the NO PART indicator flashes for 5 seconds followed by solid on for 3 seconds, check for a missing, disconnected, open or shorted transmitter probe.
4. If during the startup process, both indicators flash in unison, the system is indicating a problem in establishing operating parameters. For first-time installations, this could be an indication of too great a gap between the sensors or invalid probes
5. If during calibration, both indicators flash in unison, the system is indicating an invalid calibration. The causes can be many. Among them, an attempt to calibrate both PART and NO PART on the same condition, a part too small to be reliably detected, a 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 45440-1711. Phone: (937) 435-8659, Fax: (937) 435-2091. Mention model number and serial number.



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