SIMCO ION™

An ITW Company

PD-22

Perforation Detector

INSTALLATION AND OPERATING INSTRUCTIONS

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1. SAFETY WARNINGS

IMPORTANT – Simco-Ion Industrial Static Control recommends that these instructions be read completely before installation or operation of this power unit. Failure to do so could result in personal injury and/or damage to the unit or equipment.

Review the following safety precautions to maintain safety and prevent damage to the instrument or equipment connected to it. The safety features of this instrument may be ineffective if the equipment is not operated in the manner stated in this manual. Refer all maintenance procedures to qualified personnel.

NOTE – If any damage has occurred during shipment, notify the local carrier at once. A report should also be forwarded to Simco-Ion, 2257 North Penn Road, Hatfield PA 19440.

Terms and Symbols

The following terms and symbols appear in this manual:

CAUTION – This symbol is a warning that users must refer to this Instruction Manual for safety information. CAUTION – Statements identified with CAUTION indicate potential safety hazards.

WARNING – Warning statements identify conditions or practices that could result in injury or loss of life. Substitution of components may impair intrinsic safety.

NOTE – Statements identified with NOTE indicate precautions necessary to avoid potential equipment failure.

CAUTION

1. Read the complete Operation Manual before operating. Failure to follow instructions may result in damage to the power unit, perforation detector and/or personal injury.
2. The AC power adapter is supplied with a 3-prong inlet plug, which must be inserted into an appropriate, properly wired and grounded wall outlet.
3. A factory qualified service technician must perform component service and repairs. Please contact Simco-Ion Customer Service for information.

WARNING – Fire Hazard

Keep the unit dry. Do not operate the unit in flammable or explosive atmospheres.

CAUTION – Electrical Shock Hazard

Do not make electrical connections to the unit while high voltage is present.

2. DESCRIPTION

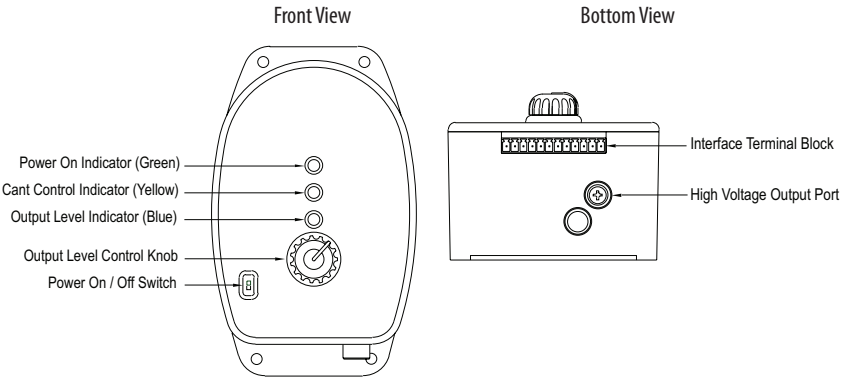
The PD-22 is an adjustable output, DC electrostatic generating power supply designed for use with a variety of Simco-Ion perforation detectors and applicators. Using the principles of electrostatic discharge, the units' high voltage, fixed polarity output provides a method to detect perforations in webs on a variety of materials, for example during the manufacture of plastic bags.

The compact size of the PD-22 power supply makes it well suited for machinery environments where operating clearances are greatly limited. Because of its low weight and shock resistance it can be mounted directly to a gantry or robot arm in automated perforation detection processes. The front panel of the power supply features an LED array to provide a continuous indication of the unit's operating condition and level of the adjustable output.

The PD-22 is powered from a 24 VDC input. The input voltage is supplied from the provided AC line adapter which is plugged into the terminal block in the end of the unit. The input voltage may alternately be supplied to the terminal block from an auxiliary 24 VDC power bus located in the parent machinery. The units' terminal block also includes relay contact connections for indication of when the unit has been turned on, i.e., turn on power sensing.

Features

- Compact size and light weight
- Easy installation and operation
- Adjustable output with visual display
- Power turn on condition indicator with outputs
- Multiple unit connectability using auxiliary power bus



3. SPECIFICATIONS

Input power	24 VDC, 0.6 A, 14W (max)
Output Voltage	6 to 22 kVDC (negative polarity)
Detector Output	15 ms typical pulse optocoupler Collector-emitter voltage (VCEO) 30 VDC Switching current (IF) 60 mA
Detector Frequency	15 Hz max
Operating Temperature	32°F (0°C) to 122°F (50°C)
ON/OFF Control	Power switch provided on front panel
Status Indicators	Power: Green LED Count Control: Yellow LED Output Voltage: Blue LED
Interface Connections	(12) position Terminal block provided at end panel for Standard / auxiliary power input and alarm output connections. (Mating plug supplied with the unit)
Enclosure	Glass Reinforced Polycarbonate (UL94V-0), color: black
Overall Dimensions	6.10″ L x 3.79″ W x 3.10″ D (154.9L x 96.3W x 78.7D mm)
Weight	1.55 lb (0.70 kg)
Mounting	Four 0.203″ (5.2 mm) diameter holes in flanges for screw mounting
Universal AC Adapter	100-240 VAC input / 24 VDC, 1.66 A output Maximum of 2 PD-22 units can be powered
Compliant	RoHS

4. INSTALLATION

Carefully remove the equipment from the carton and inspect the contents. See Section 9 (Warranty) for Return Shipment information.

NOTE – If any damage has occurred during shipment, notify the local carrier at once. A report should also be forwarded to Simco-Ion, 2257 North Penn Road, Hatfield PA 19440.

The PD-22 power supply is intended for fixed mounting onto a flat and rigid surface. Holes in the flanges of the unit enclosure are provided for screw mounting to the selected surface. The power unit enclosure may be used as a template to mark the hole locations onto the surface. The use of #8 or #10 screws, flat washers and nuts are suggested for the final mounting.

(Because of the many possible mounting situations, screw and nut hardware is not included with the power supply). It is recommended that the unit be positioned so the wiring and charging device cabling exits in a downward direction. This positioning is preferred to minimize stresses that could kink or pinch the wire and cable insulation. Allow for wire and cable flex and support if the installation will be subject to repetitive motion.

Insert the 24 VDC output (+ wire) of the AC adapter or auxiliary power bus into position #1 of the Interface plug and tighten the clamping screw. Insert the Ground (return wire) of the adapter or power bus into position #2 of the Interface plug and tighten the clamping screw, see Fig 1. and Fig 2. for remote and non-remote wiring connections respectively. Connect a wire from Pin 8 to the machine frame.

Interface Terminal Block Position Assignments for REMOTE/PLC Operation

Position	1	2	3	4	5	6	7	8	9	10	11	12
Function	+24 V	GND	K1 n/o	K1 com	K1 n/c	SD +24V	SD gnd	GND	Optocoupler "Collector"	Optocoupler "Emitter"	+24 V link	GND link

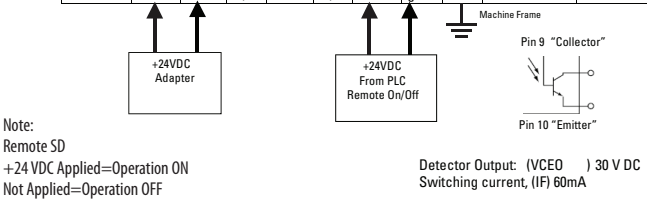


Figure 1. Connection for Remote/PLC Operation

Interface Terminal Block position assignments for NON-REMOTE/PLC operation

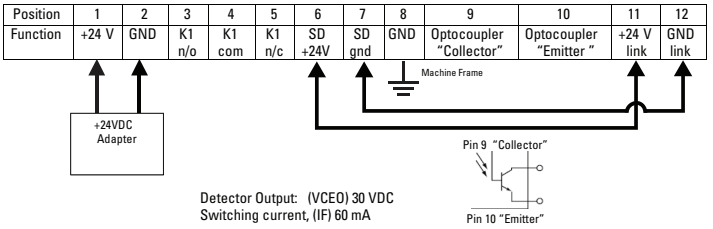


Figure 2. Connection for NON-Remote/PLC Operation

Engage the plug into the terminal block at the end of the PD-22 power supply to complete the input connections. See the Terminal block position assignment diagram for wiring of the optional power on relay contact detection, and detector output wiring feature.

Fig 3. and Fig 4. shows the wiring configuration for the logic "AND" function both in remote and non remote PLC wiring connections respectively. Logic "AND" function requires the use of two PD-22's with their respected detector outs wired in series. In this configuration a perforation count only is triggered when both PD-22's detector outputs are turn on. This application is usually implemented in bag counting to be able to distinguish between the beginning of the bag with handles and the end of the bag where the perforation of separation is the desired count metric desired. Shown below is the logic truth table for the perforation count in the logic "AND" configuration.

Interface Terminal Block position assignments for REMOTE/PLC "AND" operation

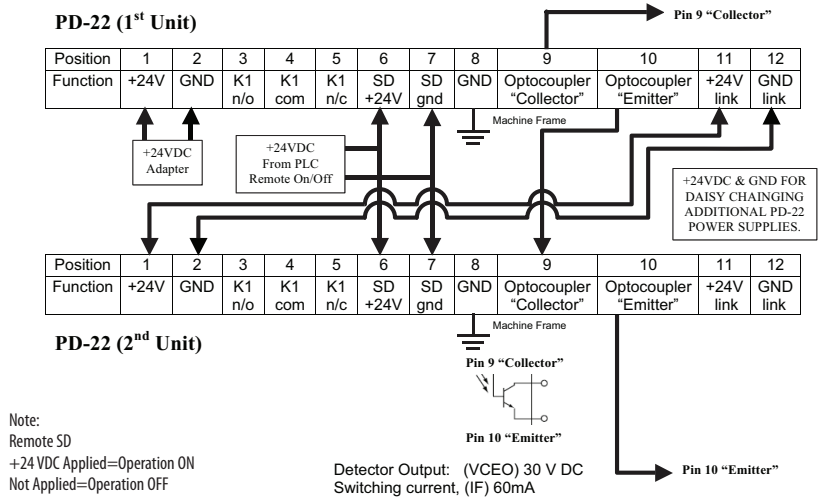


Figure 3 Connection for Remote/PLC "AND" Operation Using Two PD-22's

Truth Table for LOGIC AND		
PD-22 Unit 1	PD-22 Unit 2	PERF COUNT
Off	Off	No
Off	On	No
On	Off	No
On	On	Yes

Interface Terminal Block Position Assignments for NON-REMOTE/PLC "AND" Operation

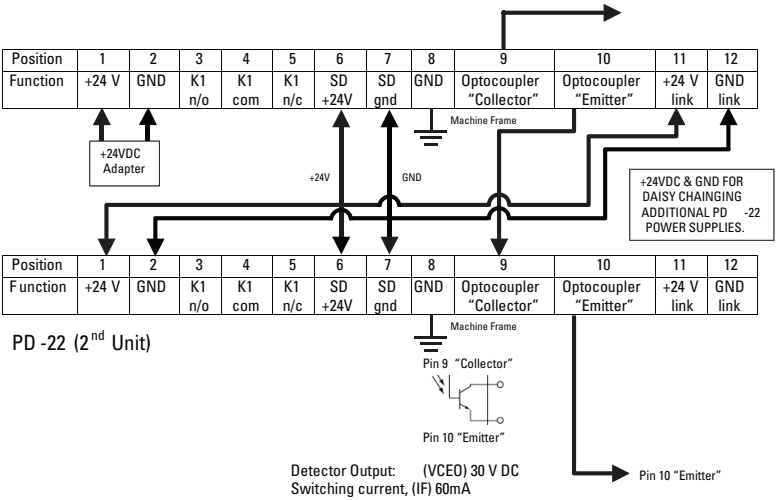


Figure 4 Connection for NON-Remote/PLC "AND" Operation with Two PD-22's

Truth Table for LOGIC AND		
PD-22 Unit 1	PD-22 Unit 2	PERF COUNT
Off	Off	No
Off	On	No
On	Off	No
On	On	Yes

Setting Up Detector Probe

Set up the detector probe(s) at the location(s) where you want to detect perforations. Only use high voltage detector probes manufactured by Simco-Ion such as the EL-10. An electrically grounded roller of the machine may be used as the ground electrode. The material must be in close contact with the ground electrode. Install the detector probe opposite the ground electrode. The optimum distance between the two electrodes is 1/8" to 3/16" (3 to 5 mm).

Route the high voltage cable to the power supply. Do not route the cable across sharp metal edges or make sharp bends in the cable. To avoid malfunctions, the high voltage cable must be mounted to avoid the control cable wiring.

Engage the plug from the detector probe into the HV Output port and tighten the nut finger-tight.

Secure the AC adapter in a location suitable for connection to the AC line.

NOTE – Verify that the mounting and connections of the PD-22 power supply and charging devices are properly installed prior to turning on the equipment.

5. OPERATION

ON / OFF SWITCH – Switch turns the PD-22 power supply on or off.

POWER – "GREEN LED" illuminates when the power supply is switched On.

COUNT CONTROL – "YELLOW LED" illuminates when a perforation is detected.

OUTPUT – "BLUE LED" illuminates when there is High Voltage present on the output ports. LED is dim when Kilovolt Output knob is pointed to its lowest setting indicating 6 kV output present at the charging device ports. The LED gradually gets brighter as the knob is rotated to its full clockwise setting indicating a maximum 22 kV output is present at the charging device ports.

KILOVOLT OUTPUT KNOB – Controls the output of the High Voltage supply. At its lowest setting of 6 kV, knob is turned fully counter-clockwise and "BLUE LED" is dimly lit. At its highest setting of 22 kV, the knob is turned fully clockwise, and the output "BLUE LED" is brightly lit. Knob adjustment provides for mid-range output between the available voltage limits.

HIGH VOLTAGE OUTPUT – This port provides the connection to Simco-Ion perforation detection devices.

12 POSITION TERMINAL BLOCK – Terminal block is used to make the following connections: +24 VDC power input, power input return / GND, dry contact power on indicating relay K1, remote enable / disable, machine frame ground, perforation detection output, and +24 VDC power output & power return / GND link for daisy chaining additional PD-22 power supplies. See the following diagram for position assignments.

Interface Terminal Block Position Assignments												
Position	1	2	3	4	5	6	7	8	9	10	11	12
Function	+24V	GND	K1 n/o	K1 com	K1 n/c	SD +24V	SD gnd	GND	Optocoupler "Collector"	Optocoupler "Emitter"	+24V link	GND link

Position 1 +24 VDC supply must be connected at this position.

Position 2 GROUND (return) from the +24 VDC supply must be connected to this position

Position 3 Relay K1 normally open dry contact (n/o)

Position 4 Relay K1 common dry contact (com)

Position 5 Relay K1 normally closed dry contact (n/c)

Position 6 Remote shut down SD, a PLC may be connected here to remotely enable / disable operation
+24 VDC applied = enable, operation ON
0 VDC applied = disabled, operation OFF

Position 7 Remote shut down SD (gnd). Ground (return) from PLC remote enable / disable signal

Position 8 Machine Frame Ground

Position 9 Opto-coupler Collector, used for perforation detection, via PLC or hardware means. Floating Output

Position 10 Opto-coupler Emitter, used for perforation detection, via PLC or hardware means. Floating Output

Position 11 +24 VDC (LINK), for connection to additional PD-22 power supplies.

Position 12 GND (LINK) return for connection to additional PD-22 power supplies.

(RELAY K1) Relay K1 state is associated with the "GREEN LED", which indicates if the power supply is turned on. Its contacts changes state if the power supply is turned off. This relay is a Single Pole Double Throw Relay, (SPDT); it has three output leads as follows…

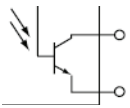
Position 3 K1 normally open, (NO)

Position 4 K1 common (C)

Position 5 K1 normally closed (NC)

NOTE – Relay contact rating 24 VDC @ 2A.

(OPTO-COUPLER)- Perforation detector output, Opto-coupler "Collector", and Opto-coupler "Emitter" is associated with the "YELLOW LED", which indicates the "COUNT CONTROL" when a perforation is detected. If a perforation is detected, a signal will be sent via an opto-coupler to the output connector. This signal is suitable for sending to a PLC or to the control circuit of the machine. Signal apparatus such as a buzzer or lamp must be connected via a PLC, or other hardware means. Shielded cable should preferably be used for the connection to the PLC or the machine control circuit. The two output leads provided are as follows:



Position 9 Opto-coupler "Collector"
Position 10 Opto-coupler "Emitter"

Detector Output: (VCEO) 30 V DC
Switching current, (IF) 60mA

6. MAINTENANCE

CAUTION – Disconnect the power supply before attempting any cleaning operation.

The exterior surface of the PD-22 power supply can be cleaned with a soft cloth moistened with common window cleaning solution. Alcohols or solvent-based cleaners must not be used.

NOTE – The monitor enclosure is not liquid tight and must not be subjected to aerosol sprays or condensation, as damage to the internal circuitry may occur.

Clean the EL-10 detector probe with a non-metallic (Nylon) bristle brush. Alcohol may be used to assist in removing stubborn deposits. Allow alcohol to dry before applying power.

7. TROUBLESHOOTING

This information provides a quick troubleshooting reference for the PD-22 power supply. Should any of these possible solutions not solve the problem, please contact Simco-Ion Customer Service.

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Power supply fails to operate (green indicator off)	AC adapter not connected	Check all electrical connections
	AC adapter defective	Replace AC adapter
Power supply fails to operate perforation electrode device (green indicator on)	Perforation device connections loose	Tighten perforation device connectors into power supply
Too many sparks at the electrode	High voltage set too high Holes in the material	Reduce high voltage Check material
Undefined sparks	Sensitivity too high Contaminated material	Reduce sensitivity Material not suitable, replace material
"Count control" LED works, no pulse at the output	Detector faulty	Have detector repaired
"Count control" LED does not work No pulse at the output No pulse at the electrode	Material speed too high Foulded electrodes Electrodes too far apart Material not properly perforated	Reduce speed Clean electrodes Reduce electrode distance Check perforations
	Electrode not properly connected Earth electrode not properly connected	Check electrode connections Connect earth electrode properly

8. PARTS AND ACCESSORIES

Item	Part Number
PD-22	4014683
EL-10 Detector Probe	4105292

9. WARRANTY

This product has been carefully tested at the factory and is warranted to be free from any defects in materials or workmanship. Simco-Ion will, under this warranty, repair or replace any equipment that proves, upon our examination, to have become defective within one year from the date of purchase.

The equipment being returned under warranty should be shipped by the purchaser to Simco-Ion, 2257 North Penn Road, Hatfield PA 19440, transportation prepaid and insured for its replacement cost. Prior to returning any goods for any reason, contact Simco-Ion Customer Service at (215) 822-6401 for a Return Authorization Number. This number must accompany all returned items.

This warranty does not apply when the equipment has been tampered with, misused, improperly installed, altered, has received damage through abuse, carelessness, accident, connected to improper line voltage, or has been serviced anyone other than an authorized factory representative.

The warranty does not apply when Simco-Ion parts and equipment have been energized by other than the appropriate Simco-Ion power supply or generator, or when a Simco-Ion power supply or generator has been used to energize other than Simco-Ion parts and equipment. Simco-Ion makes no warranty, expressed or implied, nor accepts any obligation, liabilities, or responsibility in connection with the use of this product other than the repair or replacement of parts stated herein.

Information in this publication supersedes that in all previous published material. Specifications are subject to change without notice.

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