CA300
DIAPHRAGM DISPENSE VALVE

Version: B12-2097
Revision: C

Operation Manual

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Preface

CA300 Diaphragm Dispense Valve, Air Actuated

Thank you for purchasing the CA300 dispensing valve from PVA. Before attempting to operate the CA300, we recommend that you take a few minutes and read the following operation and setup manual. This will assist in familiarizing you with the product and ensure a successful installation.

As always, if any questions or problems arise, do not hesitate to contact PVA's Valve Service Department for support. This department can be reached at PVA headquarters via telephone or e-mail.

Again, thank you for your purchase, and we look forward to assisting you in the future as you continue to improve your dispensing processes.

PVA Contact Information

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Table of Contents

Theory of Operation

The CA300 is an all plastic dispense valve that uses a unique rigid diaphragm design to act as a front closing valve to accurately dispense small dots and fine beads. This valve can be used in handheld applications, mounted on a fixture for hands free dispensing, or mounted to a robot for automated dispensing. The all plastic construction allows adhesives such as Cyanoacrylates and Anaerobics to be dispensed through the valve along with a variety of other low to high viscosity fluids. Applications can include dispensing dots, beads, or for potting.

The CA300 has a divorced design comprising of two major sections. These include:

- Air section (Aluminum top portion)
- Fluid section (Delrin body with Teflon diaphragm)

Air Section

The air section is an aluminum body with a simple piston/cylinder combination used to open and close the valve. A stroke adjustment bolt in the upper air body controls how far the piston and needle assembly can retract thus regulating the rate of fluid flow.

Fluid Section

The fluid section is made up of a Delrin with a rigid Teflon diaphragm connected to the air piston. Fluid dispenses as the point of the diaphragm is lifted out of the fluid section orifice then stops as it moves back into place. The stroke adjustment bolt of the air cylinder regulates the distance that the diaphragm tip can lift out of the fluid section orifice thus controlling rate of fluid flow.

Wetted Parts

Wetted parts on the CA300 include:

- Delrin
- Teflon
- Kalrez
- Polyethylene

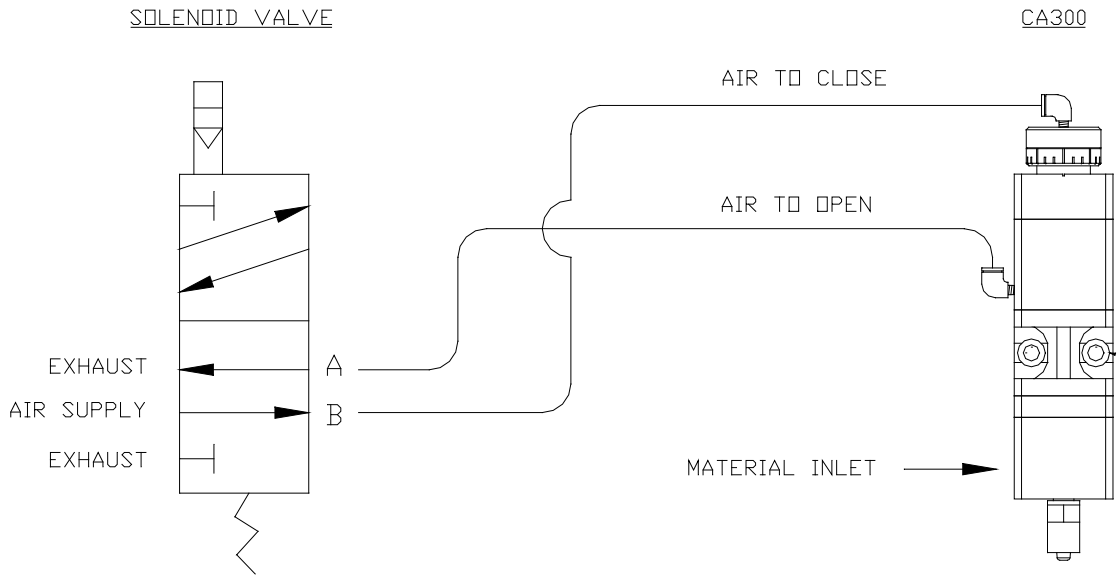
Safety

Due to material contents being under pressure eye protection is required for operators. Refer to MSDS sheets on material being dispensed for other precautions.

Setup

The CA300 requires a 2-position, 4-way air solenoid valve to actuate the air section. The valve should be operated with clean, dry air between 60-100psi. Two #10-32 threaded air ports are located on the air section of the valve. The port located on the side of the fluid section is air to open the valve. The port located on the top of the stroke adjustment bolt is air to close the valve. Quick connect air fittings are typically supplied with the CA300 to fit 5/32" tubing. Note that the valve should be normally in the closed position.

Fluid is supplied to the CA300 through the 1/8"npt port located on the Delrin fluid section of the valve.



Tool Kit

PVA offers standard tool kits for all dispensing valves. The tool kit for the CA300 is part number **B12-2247**, which includes all necessary tools to perform maintenance on this dispense valve:

B12-2247 Includes:

Qty	Part Number	Description
1	0266244	8" Adjustable Wrench
1	26571	5/32" Hex Key
2	26563	3/32" Hex Key
1	9570K71	Hook and Pick Set
1	5415K61	Snap Ring Pliers
1	B62-2048	Silicone Lubricant for o-rings, 2.5cc
1	8511A17	Removable Thread Locker

Operation

Refer to assembly drawing **112-2869** for part reference numbers.

1) Plumb up the valve as outlined above in the **Setup** procedures.
2) Regulate the air pressure operating the valve between 60-100psi.
3) Making sure that the valve is not aimed toward anyone, cycle the valve several times. When the valve is cycling, the piston can be heard hitting the stroke adjustment bolt, and the rod (7) can be seen going up and down in the center. If the valve is not cycling properly, refer to the **Troubleshooting** section
4) When the fluid delivery system is connected to the valve, pressurize the material to be dispensed.
5) Once again cycle the valve open to purge. Fluid should begin to dispense from the tip of the valve. Continue dispensing until all air is removed.
6) Check fluid connection for leaks. If the valve is leaking or dripping, refer to the **Troubleshooting** section.
7) Adjust the material pressure until the desired fluid flow is achieved.
8) Turn the stroke adjustment bolt (12) until the desired flow rate is achieved. Turning the adjustment clockwise will decrease the material flow rate and counter-clockwise will increase the material flow rate. If the stroke is turned all the way down, it will stop fluid flow entirely.
9) Once the stroke is set, tighten the set screw (20) against the stroke adjustment (12) using a 0.050" Hex key.

Note: Refer to Troubleshooting section for any problems.

Routine Cleaning and Disassembly

Cleaning and rebuilding the valve will be required from time to time. A spare parts kit, part # **CA3-SP** is available with all the normal wear parts included.

Fluid Section

1) If possible, flush the valve thoroughly with an appropriate solvent before disassembly. (Refer to MSDS sheets of fluid for suggested solvent)
2) Begin disassembly by first removing fluid pressure from the system.
3) Remove operating air pressure from the valve.
4) Remove all pneumatic tubing and fluid delivery fittings, hoses, etc. from the valve.
5) Using an adjustable wrench, unthread and remove the luer adapter (4) from the fluid section (3).
6) Using a 3/32" Hex key, evenly remove the four machine screws (17) from the bottom of the fluid section (3) that secure it to the separation block (1).
7) Slide the fluid section (3) away from the diaphragm (2) to remove the o-ring (21).
8) Unthread the diaphragm (2) from the rod (7) by turning it counter clockwise.
9) Clean all of the wetted parts thoroughly with an appropriate solvent.

10) Using a 3/32” Hex key, evenly remove the four machine screws (16) from the upper air body (11) that secure it to the separation block (1). Note: During removal that the spring (19) will force the air section apart.

Air Section

11) Separate the upper air body (11) assembly from the lower air body (5) assembly to remove the spring (19) then slide the separation block (1) off the rod (7).
12) Using snap ring pliers, remove retaining ring (18) from the stroke adjust bolt (10).
13) Remove the 019 Buna o-ring (14) from the upper air body (11).
14) Using a 0.050” Hex Key, remove the set screw (20) from the upper air body (11)
15) Unthread and remove the stroke adjust bolt (10) from the upper air body (11) then remove the 014 Buna o-ring (13) from the stroke adjust bolt.
16) Holding the lower air body (5) in one hand, grab the rod (7) to push the piston (6) assembly out of the lower air body.
17) Remove the 007 Buna o-ring (10) from the bottom of the lower air body (5).
18) Hold the piston (6) with an adjustable wrench then use a 5/32” Hex key to unthread and remove the set screw (8) to remove the rod (7) then remove the 116 Buna o-ring (9) from the piston.

Replace components with spares provided in the spare parts kit.

General Assembly Instructions

- All o-rings must be lubricated with a small amount of silicone grease.
- A small amount of removable thread locker should be applied to the set screw (8).

Valve Assembly

1) Mount the 014 Buna o-ring (13) onto groove of the stroke adjust bolt (12).
2) Thread the stroke adjust bolt (12) into the upper air body (11) then insert the set screw (20) using a 0.050” Hex key but leave loose.
3) Using snap ring pliers, mount the retaining ring (18) onto the stroke adjust bolt (12) then turn the stroke adjust bolt counter clockwise until the end of its travel.
4) Mount the 019 Buna o-ring (14) onto the upper air body (11).
5) Drop the rod (7) into the piston (6) and assemble with the set screw (8) using an adjustable wrench and 5/32” Hex key to tighten.
6) Mount the 116 Buna o-ring (9) onto the piston (6).
7) Apply a small amount of silicone grease to the inside of the lower air body (5) then drop in the piston and rod assembly.
8) Mount the 007 Buna o-ring onto the end of the rod (7) and slide it down into the groove of the lower air body (5).
9) Insert the threaded of the rod (7) through the smaller ID hold of the separation block (1) until the separation block hits the lower air body (5).

10) Place the spring (19) onto the lower air body (5) on top of the piston (6) then place the upper air body (11) onto the spring and assemble using four machine screws (16) using a 3/32" Hex key to tighten them down evenly.
11) Thread the diaphragm (2) onto the end of the rod (7) until it is secure the continue turning until it is square with the body of the valve.
12) Place the o-ring (21) into the groove of the fluid section (3).
13) Place the fluid section (3) onto the diaphragm and assemble using the four machine screws (17) using a 3/32" Hex key to tighten them down evenly.
14) Thread the plastic luer adapter (4) into the bottom of the fluid section (3) and tighten using an adjustable wrench.

Note: Be sure not to over tighten the luer adapter.

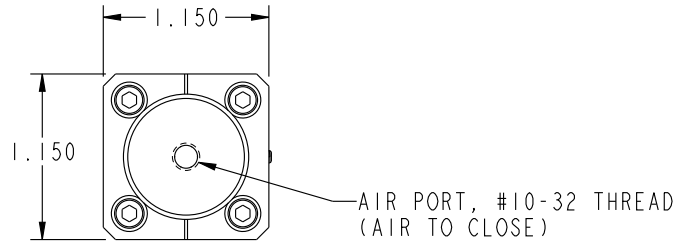
Spare Parts

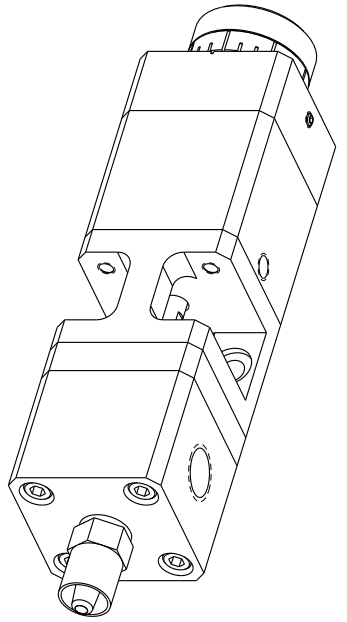
PVA offers standard spare parts kits for all dispensing valves. These kits are stocked for immediate shipment and allow replacement of all wearable parts of the valve.

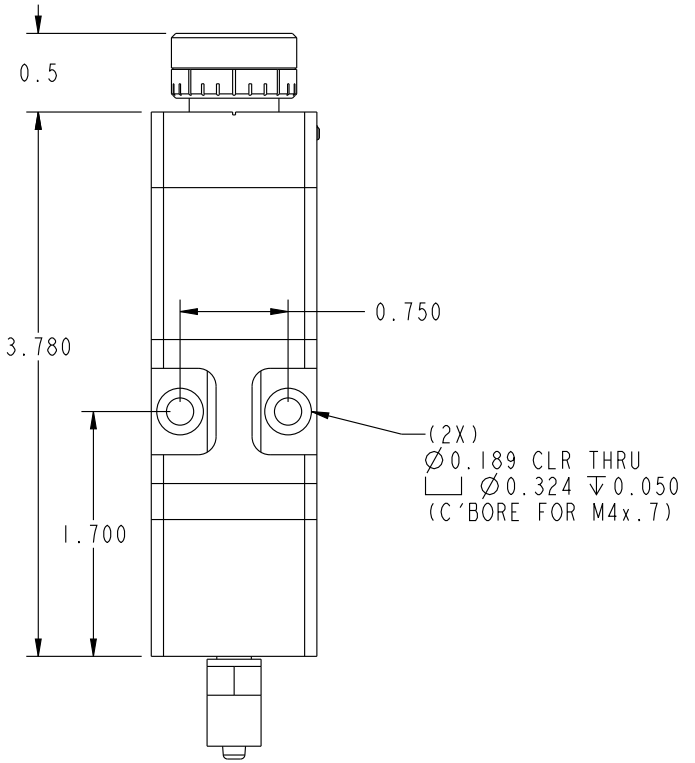
The spare parts kit for this valve, product number **CA3-SP**, includes the following components:

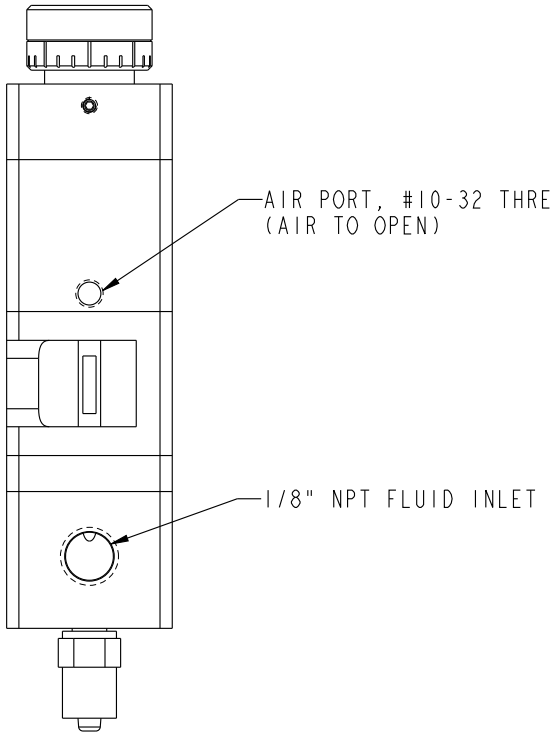
CA3-SP Includes:

Qty	Part Number	Description
1	114-9539	Diaphragm
1	V300-UV	Luer Adapter
1	VLV-116B	Buna O-Ring
1	VLV-007B	Buna O-Ring
1	VLV-014B	Buna O-Ring
1	VLV-019B	Buna O-Ring
1	VLV-016K	Kalrez O-Ring









REV	REVISION DESCRIPTION	DRN BY	DATE	DESIGN
A	REF. BOM # B12-2097	RJB	19FEB09	RJB
B	ADD O-RING	DER	4/9/15	JA
C				
D				
E				
F				

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

DECIMAL	ANGULAR
.X ± 0.2	± 0.5°
.XX ± 0.01	
.XXX ± 0.005	
.XXXX ± 0.0005	

Precision Valve & Automation
One Mustang Drive
Cohoes, NY 12047

PART TITLE: CA300

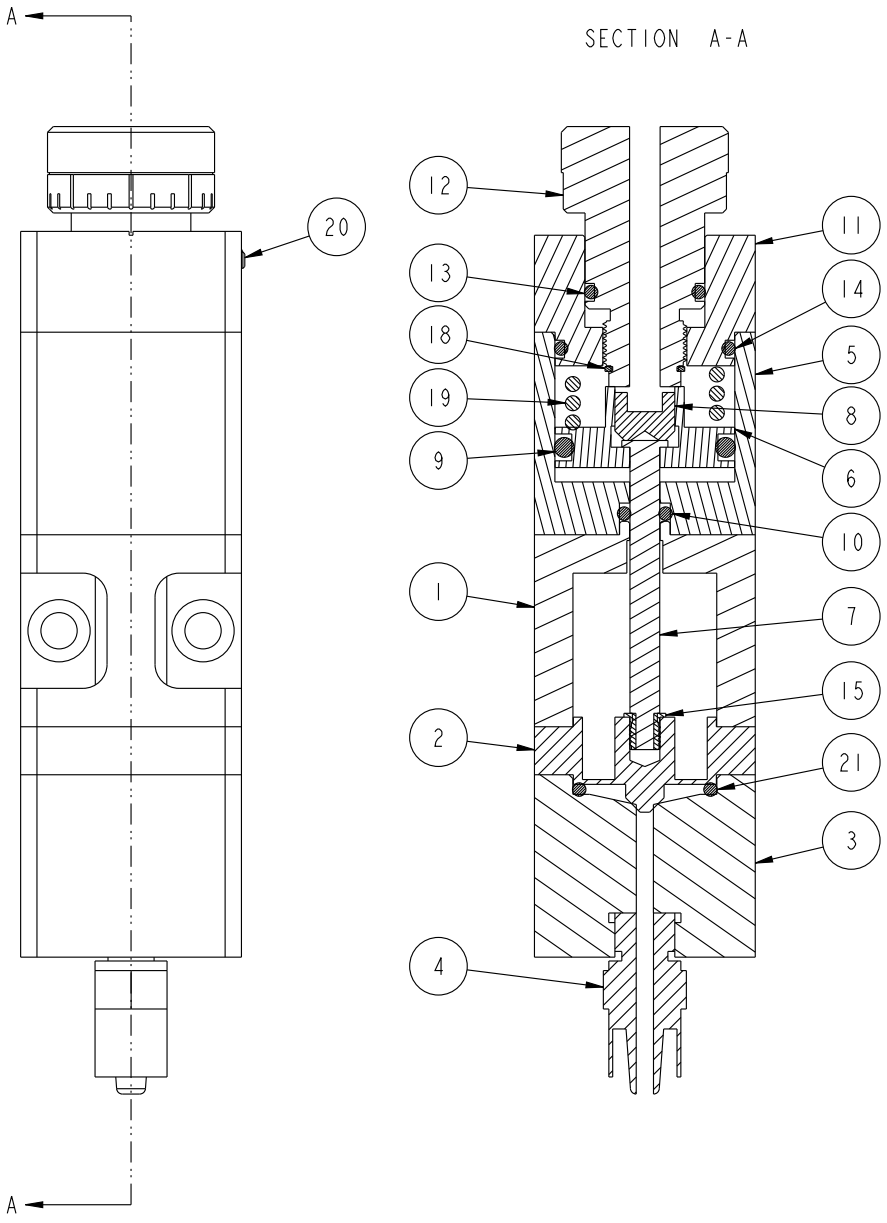
MATERIAL: SEE BOM TABLE

DRAWING NUMBER: 112-2869

PART FINISH: N/A

SHEET: 1 OF 2

REV: A



REF #	PART NUMBER	REV	DESCRIPTION	QTY	MATERIAL	S/P KIT
1	114-8514	E	SEPARATION BLOCK	1	300 SERIES SST	
2	114-9539	B	DIAPHRAGM	1	BLACK TEFLON	*
3	114-8546	F	FLUID BODY	1	BLACK DELRIN	
4	V300-UV		LUER ADAPTER, MALE	1	BLACK DELRIN	*
5	114-8515	C	LOWER AIR BODY	1	ALUMINUM	
6	V224	C	PISTON	1	303 STAINLESS STEEL	
7	114-8523	B	ROD	1	303 SS	
8	V079		SET SCREW	1	18-8 STAINLESS STEEL	
9	VLV-116B		O-RING, -116, BUNA-N	1	BUNA-N	*
10	VLV-007B		O-RING, -007, BUNA-N	1	BUNA-N	*
11	114-8917	C	UPPER AIR BODY	1	ALUMINUM	
12	114-8916	B	STROKE ADJUST	1	300 SERIES	
13	VLV-014B		O-RING, -014, BUNA-N	1	BUNA-N	*
14	VLV-019B		O-RING, -019, BUNA-N	1	BUNA-N	*
15	95110A112		EXPANSION INSERT	1	18-8 SS	*
16	SH5-40-1500		CAP SCREW, #5-40	4	STEEL	
17	SH5-40-1250		CAP SCREW, #5-40	4	STEEL	
18	98410A117		SNAP RING, 0.338" ID	1		
19	01511		SPRING	1	SPRING STEEL	*
20	90291A106		SETSCREW, #4-40 X .25"	1		
21	VLV-016K		O-RING, -016, KALREZ	1	KALREZ	*

REV	REVISION DESCRIPTION	DRN BY	DATE	DESIGN
A	REF. BOM # B12-2097	RJB	19FEB09	RJB
B	ADD O-RING	DER	4/9/15	JA
C				
D				
E				
F				

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

DECIMAL	ANGULAR
.X ± 0.2	± 0.5°
.XX ± 0.01	
.XXX ± 0.005	
.XXXX ± 0.0005	

PVA
Precision Valve & Automation
One Mustang Drive
Cohoes, NY 12047

PART TITLE: CA300

MATERIAL: SEE BOM TABLE

DRAWING NUMBER: 112-2869

PART FINISH: N/A

SHEET: 2 OF 2

REV: A

BILL OF MATERIALS FOR CA300 (B12-2097):

Refer to Drawing #: 112-2869

Item	Part Number	Description	Quantity
1	114-8514	Separation Block	1
2	114-9539	Diaphragm	1
3	114-8546	Fluid Section, Delrin	1
4	V300-UV	Luer Adapter	1
5	114-8515	Lower Air Body	1
6	V224	Piston	1
7	114-8523	Rod	1
8	V079	Set Screw	1
9	VLV-116B	Buna O-Ring	1
10	VLV-007B	Buna O-Ring	1
11	114-8917	Upper Air Body	1
12	114-8916	Stroke Adjust	1
13	VLV-014B	Buna O-Ring	1
14	VLV-019B	Buna O-Ring	1
15	95110A112	Insert, Threaded	1
16	SH5-40x1.50	Socket Head Cap Screw	4
17	SH5-40c1.25	Socket Head Cap Screw	4
18	98410A117	Retaining Ring	1
19	01511	Spring	1
20	90291A106	Setscrew, #4-40 x 0.25” w/ nylon tip	1
21	VLV-016K	Kalrez O-Ring	

Troubleshooting

Problem	Possible Cause	Corrective Action
Valve does not cycle	Air pressure to air section is too low Stroke adjustment bolt is bottomed out Material has cured in the valve Valve was assembled w/o lubricating the O-ring seals	Increase air pressure to between 60-100 psi Back out stroke adjustment bolt by turning it counter-clockwise Disassemble and clean valve Disassemble valve, lubricate seals and re-assemble
Material leaks from valve tip	Diaphragm is worn Air bubble trapped in fluid body or in dispense needle	Replace diaphragm Flip valve upside down and cycle until air bubbles are removed
Valve leaks from mid-section	Diaphragm is worn or damaged	Replace diaphragm
Valve does not dispense anything	Fluid pressure is too low Material has cured in fluid section Stroke adjustment bolt is set too low	Increase fluid pressure Disassemble and clean valve Back out stroke adjustment bolt by turning it counter-clockwise
Air bubbles in fluid	Valve not properly purged Problem with fluid delivery system	Flip valve upside down and cycle until air bubbles are removed Diagnose and repair.
Dispense rate too fast	Fluid pressure set too high Stroke adjust set too high Dispense tip gauge too large	Decrease fluid pressure Turn stroke adjust clockwise Replace dispense tip with smaller size
Dispense rate too slow	Fluid pressure set too low Stroke adjust set too low Dispense tip gauge too small	Increase fluid pressure Turn stroke adjust counter-clockwise Replace dispense tip with larger size

PVA Warranty Policy

PVA warrants the enclosed product against defects in material or workmanship on all components for one year from the date of shipment.

The warranty does not extend to components damaged due to misuse, negligence, or installation and operation that is not in accordance with the recommended factory instructions. Unauthorized repair or modification of the enclosed product, and/or the use of spare parts not directly obtained from PVA (or from factory authorized dealers) will void all warranties.

All PVA warranties extend only to the original purchaser. Third party warranty claims will not be honored at any time.

Prior to returning a product for a warranty claim, a return authorization must be obtained from PVA's customer service department. Authorization will be issued either via the telephone, facsimile, or in writing upon your request.

To qualify as a valid warranty claim, the defective product must be returned to the factory during the warranty period. Upon return, PVA will repair (or replace) all components found to be defective in material or workmanship.

(Retain this for your records)

Product Information:

PRODUCT: _____

SERIAL NUMBER: _____

DATE OF PURCHASE: _____