WHERE

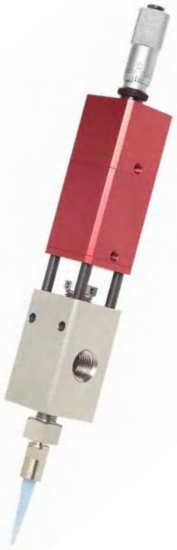
PRECISION

DRIVES

PRODUCTION

FC300

FC300-C



FC-300-MC

Front Closing Dispense Valve

FC300 Series
Operation Manual
Rev B

Precision Valve & Automation
One Mustang Drive
Cohoes, NY 12047
www.pva.net

This document is based on information available at the time of its publication. While efforts have been made to ensure the contents of this manual are accurate, the information contained herein does not purport to cover all specific details or variations in hardware, or to provide for every possible contingency in connection with installation, operation, or maintenance. Features may be described herein which are not present in all hardware and software systems. Precision Valve and Automation, Inc. assumes no obligation of notice to holders of this document with respect to changes subsequently made.

Precision Valve and Automation, Inc. makes no representation or warranty, expressed, implied, or statutory with respect to, and assumes no responsibility for the accuracy, completeness, sufficiency, or usefulness of the information contained herein. No warranties of merchantability or fitness for purpose shall apply.

This document, including the information contained herein, is the property of Precision Valve and Automation, Inc. and is considered confidential and proprietary information. It is delivered on the express condition that it not be used, disclosed, or reproduced, in whole or in part, for any reason without prior written consent of Precision Valve and Automation, Inc.

Table of Contents

1. Introduction

Before you operate this valve, read the operation and setup manual. This will help you to become familiar with the product and ensure successful operation.

If any questions or problems arise, contact PVA's Technical Support department.

1.1 PVA Contact Information

Main Office **PVA**

One Mustang Drive

Cohoes, NY 12047

Tel +1-518-371-2684

Fax +1-518-371-2688

Website http://www.pva.net

Email mailto: info@pva.net

Technical Support

Tel +1-844-734-0209

Email mailto: cs@pva.net

1.2 Document History

Revision	Revision Date	Reason for Changes
A	2012	Initial Release
B	2019	Combined FC300, FC300-C, FC300-MC Manuals

NOTE: All photographs and CAD model representations in this document are a "general representation" of the system and its components. The actual appearance of the system and its components can differ based upon customer specific configuration.

1.3 System Description

This manual applies to the following Precision Valve & Automation, Inc. valves:

FC300	Front Closing Stainless Steel Dispense Valve, High Flow
FC300-C	Front Closing Stainless Steel & Carbide Dispense Valve
FC300-MC	Front Closing Stainless Steel Dispense Valve, High Flow, Micrometer

The valves above will be referred to as the FC300 Series for the purpose of this manual. Any information relevant to a specific valve will be indicated.

1.4 Theory of Operation

The FC300 Series is a high pressure, front closing stainless steel dispensing valve that can be used in a wide variety of applications. The **FC300-C** has a carbide dispensing valve designed for dispensing a wide variety of heavily filled and abrasive fluids. Applications include general dispensing of dots, potting, and bead placement.

The FC300 Series has a divorced design comprising of two major sections. These include:

- **Air section** (red anodized portion)
- **Fluid section** (stainless steel portion)

1.4.1 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 (**FC300/FC300-C**) or a micrometer adjustment (**FC300-MC**) in the upper air body controls how far the piston and needle assembly can retract thus regulating the rate of fluid flow.

The micrometer in the **FC300-MC** will display a distance that the piston and needle will travel.

1.4.2 Fluid Section

The fluid section is a stainless-steel body which includes a needle and seat combination to control fluid flow. Fluid dispenses as the needle retracts out of the seat, then stops as the needle moves back into the seat. The stroke adjustment bolt (**FC300, FC300-C**) or micrometer (**FC300-MC**) regulates the distance that the needle can retract out of the seat, thus controlling the orifice size and rate of fluid flow.

To dispense heavily filled materials and resist wear, the **FC300-C** needle and seat are constructed of carbide and a specially designed Teflon packing.

Fluids can include but are not limited to:

- **FC300**: Epoxies, UV adhesives, silicones, RTV, grease, etc.
- **FC300-MC**: Solvents, epoxies, UV adhesives, silicones, RTV, grease, etc.
- **FC300-C**: Epoxies, silicones, solder paste, brazing paste, heat sink compounds, etc.

Wetted parts on the FC300 Series include:

- 303, 304 stainless steel
- Carbide (FC300-C Only)
- Teflon
- Kalrez®

2.Safety

Due to material contents being under pressure, eye protection is required for operators. For additional precautions, refer to the MSDS sheet for the dispensed material.

3.Setup

The FC300 Series 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 furthest from the midsection of the valve is air to close the valve. The port located closest to the mid-section of the valve is air to open the valve. Quick connect air fittings are typically supplied with the FC300 Series to fit 5/32" tubing.

Fluid is supplied to the FC300 Series through the 1/4"npt port located on the stainless steel fluid section of the valve.

Note: The valve should be normally in the closed position.

Figure 1: Solenoid Valve (FC300)

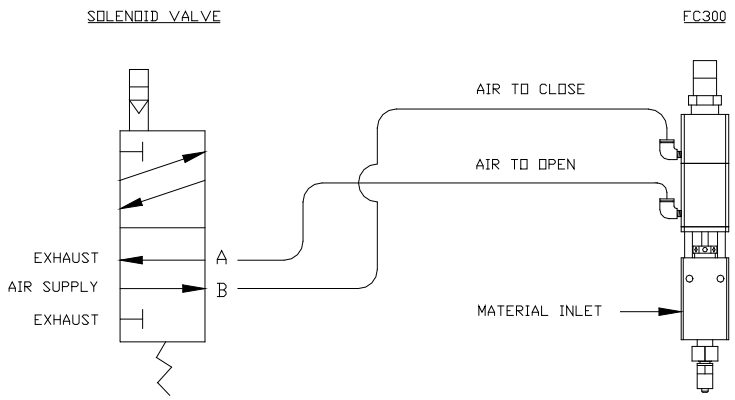


Figure 2: Solenoid Valve (FC300-C)

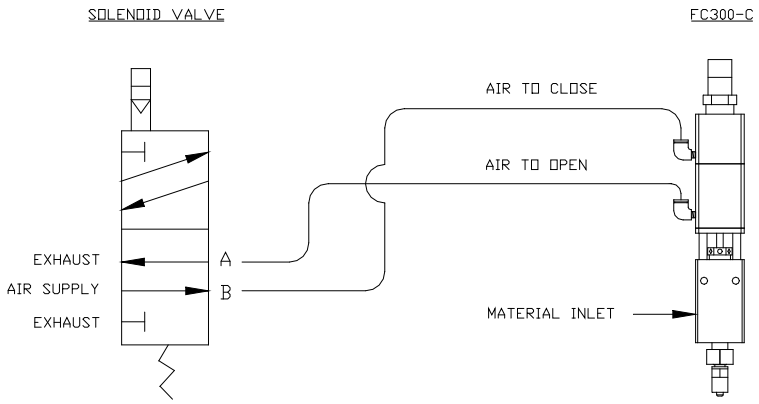
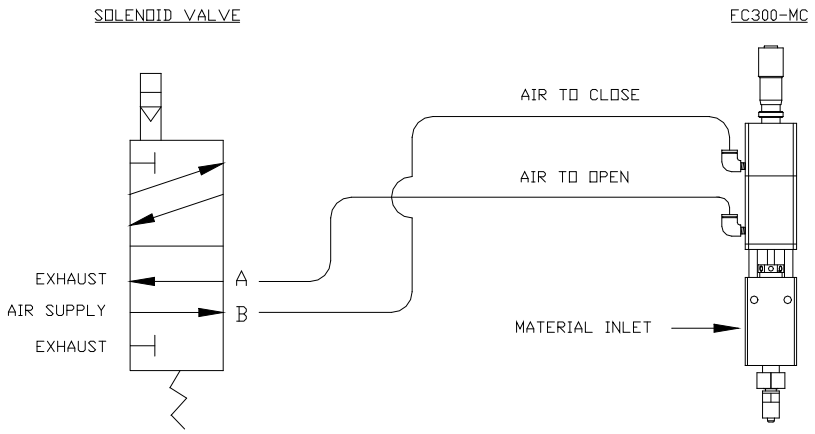


Figure 3: Solenoid Valve (FC300-MC)



3.1 Tool Kit

PVA offers standard tool kits for all dispensing valves.

3.1.1 FC300 and FC300-C Tool Kit

The tool kit for the FC300 and FC300-C is part number **B12-2015**, which includes all necessary tools and lubricating grease to perform maintenance on this dispense valve.

B12-2015 Includes:

Figure 4: FC300 and FC300-C Tool Kit

Qty	Part Number	Description
2	0266244	8" Adjustable Wrench
2	26563	3/32" Hex Key
1	26571	5/32" Hex Key
1	5516A18	Tweezers
1	B62-0752	Mineral Oil Lubrication Kit, 2.5cc
1	B62-2048	Silicone Lubricant for O-ring, 2.5cc
1	9570K71	Hook and Pick Set
1	0266255	Pliers
2	53085A61	Soft plastic covers for pliers
1	MM115	Removable Thread Locker

Note: Please contact PVA for pricing and availability.

3.1.2 FC300-MC Tool Kit

The tool kit for the FC300-MC is part number **B12-2286**, which includes all necessary tools and lubricating grease to perform maintenance on this dispense valve.

B12-2286 Includes:

Figure 4: FC300-MC Tool Kit

Qty	Part Number	Description
2	0266244	8" Adjustable Wrench
2	26571	5/32" Hex Key
1	26563	3/32" Hex Key
1	26559	1/16" Hex Key
1	5516A18	Tweezers
1	B62-0752	2.5cc Mineral Oil Lubrication Kit
1	B62-2048	2.5cc Silicone Lubricant
1	9570K71	Hook and Pick Set
1	0266255	Pliers
2	53085A61	Soft Plastic Covers for Pliers
1	PT17184	Micrometer Adjustment Wrench
1	BP135/2	Micrometer Screw Driver, #2
1	MM115	Removable Thread Locker

Note: Please contact PVA for pricing and availability.

3.2 Part Number References

- **FC300/FC300-C**: Refer to Drawing #**112-0728** for part reference numbers.
- **FC300-MC**: Refer to Drawing #**112-2664** for part reference numbers.

Please refer to the part number reference key below when reviewing the operation instructions.

Figure 5: Part Number Reference Key

Bracket Used	Drawing and Valve Indicated
( )	Either Drawing
{ }	Drawing #**112-0728** *FC300 and FC300-C*
[ ]	Drawing #**112-2664** *FC300-MC*

3.3 Operation

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 {13} or micrometer adjustment [12] and the needle (3) 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. 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 and packing nut (6) for leaks. If the valve is leaking, refer to the Troubleshooting section.
7. Turn the stroke adjustment bolt {13} or micrometer adjustment [12] until the desired flow rate is achieved.

Skip to Step 10 for FC300-MC directions.

FC300 and FC300-C Only

8. Turning the adjustment clockwise will decrease the material flow rate and counterclockwise will increase the material flow rate. If the stroke adjustment bolt is turned all the way down, it will stop the flow of fluid entirely.
9. Once the stroke adjustment setting is determined, use the adjustable wrench to tighten the lock nut (12) against the upper air body (10).

FC300-MC Only

10. **FC300-MC**: Turning the adjustment clockwise toward zero will decrease the material flow rate and counterclockwise will increase the material flow rate. If the micrometer adjustment is turned all the way down to zero, it will stop fluid flow entirely.
11. **FC300-MC**: Once the micrometer setting is determined, the collar [E] on the micrometer [12] can be turned clockwise to lock the adjustment.

Note: Refer to Troubleshooting section for any problems.

3.4 Periodic Maintenance

1. Lubricate the packing (5) on the FC300 Series valve every 200 hours by placing a few drops of mineral oil or other light oil inside the packing nut.

Note: PVA offers a 2.5cc mineral oil lubrication kit; Part#: B62-0752

2. The packing nut (6) will require occasional tightening as wear occurs in order to prevent leaks through the packing.

3.5 Routine Cleaning and Disassembly

Cleaning and rebuilding the valve will be required from time to time. A spare parts kit is available with all the normal wear parts included.

- **FC300**: Part #FC3-SP
- **FC300-C**: Part #FC3-C-SP

- **FC300-MC**: Part #FC3-MC-SP

1. Begin disassembly by removing air and fluid pressure from the valve.
2. Remove all pneumatic tubing and fluid delivery fittings, hoses, etc. from the valve.
3. Using the tip of a 3/32" Allen key, loosen the packing nut (6).
4. Using the same 3/32" Allen key, evenly remove the two machine screws {21}[19] that are located deeper inside the upper air body (10).

Note: During removal, there is a spring {20}[18] forcing the air section away from the fluid section.

5. Pull the air section (red anodized portion) away from the fluid section (stainless steel portion).
6. Clean off the tip of the stainless steel (**FC300, FC300-MC**) or carbide needle (**FC300-C**).
7. From the fluid section of the valve, unthread and remove the packing nut (6), and the packing (5).
8. **FC300 and FC300-C Only**: Using the soft tip pliers, unthread and remove the four standoffs (7) from the fluid section (4).
9. Unthread and remove the luer adapter {14}[13] and washer {15}[14].
10. Unthread and remove the needle adapter (1) from the fluid section.
11. Use the needle of the upper air section and push the seat (2) out of the fluid section. Remove the 007 Kalrez o-ring {16}[15] from the seat.
12. Clean all wetted parts thoroughly with an appropriate solvent.
13. On the air section, use a standard 3/32" Allen Key to evenly remove the final two machine screws that thread into the end cap (8).

Note: During removal, the spring will force the air section apart.

14. Separate the upper air body from the lower air body (9) to remove the spring then slide the end cap off of the needle.
15. Holding the lower air body in one hand, grab the needle and push the needle and piston (11) assembly out of the lower air body.
16. Remove the 007 Buna o-ring {17}[16] from the lower air body.

Skip to Step 20 for FC300-MC directions.

FC300 and FC300-C Only

17. Hold the piston with an adjustable wrench, then use a 5/32" Allen key to unthread and remove the set screw {22} to remove the needle then remove the 116 Buna o-ring {18} from the piston.
18. Remove the 116 Buna o-ring {18} from the upper air body and the 011 Buna o-ring {19} from the stroke adjust bolt {13}.
19. Unthread the stroke adjust bolt {13} from the upper air body (10) and remove the 011 Buna o-ring {19}.

Continue to Step 24.

FC300-MC Only

20. Using two adjustable wrenches, unthread and separate the set screw [20] from the piston to remove the needle then remove the 116 Buna o-ring [17] from the piston.
21. Remove the 116 Buna o-ring [17] from the upper air body the use a 1/16" Allen key to remove the set screw [21].
22. Using soft tip pliers grip the collar [E] or midsection [D] of the micrometer [12] and turn counterclockwise to loosen then unthread and remove from the upper air body by hand.
23. Remove the 007 Buna o-ring [16] from the micrometer [12].

---

24. Replace components with spares provided in the spare parts kit.

3.6 Assembly Instructions

3.6.1 General

- 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 {22}[20] and the male threads of the standoffs (7).
- Assemble the air section and fluid section separately prior to connecting the two assemblies.

3.6.2 Air Section

Skip to Step 6 for FC300-MC directions.

FC300 and FC300-C Only

1. Assemble the stroke adjust {13} and lock nut {12} with the hex head toward the knurled end of bolt.
2. Mount one 011 Buna o-ring {19} on the inside groove on the stroke adjust {13}.
3. Assemble the stroke adjust assembly into the upper air body (10).
4. Mount one 116 Buna o-ring {18} on the end of the upper air body and the other 011 Buna o-ring {19} on the end groove of the stroke adjust {13}. Back out the stroke adjust by turning counterclockwise to the end of its travel.
5. Drop the needle (3) into the piston (11) and assemble with the set screw {22} using an adjustable wrench and 5/32" Allen key to tighten.

Continue to Step 13.

FC300-MC Only

6. Mount one 007 Buna o-ring [16] on the end [F] of the micrometer [12] and slide it up to the threads.
7. Thread the micrometer into the upper air body (10) hand tight.
8. Holding the collar [E] of the micrometer, turn the dial [C] counterclockwise until the number 5 can be seen on the midsection [D].
9. Using soft tip pliers grab the midsection [D] section of the micrometer and turn clockwise to snug it onto the upper air bod.
10. Use a 1/16" Allen key to assemble the set screw [21] into the upper air section, securing the micrometer in place.
11. Mount one 116 Buna o-ring [17] on the end of the upper air body.
12. Drop the needle (3) into the piston (11) and assemble with the set screw [20] using two adjustable wrenches to tighten.

---

13. Mount the 116 Buna o-ring {18}[17] onto the piston.
14. Apply a small amount of silicone grease to the inside of the lower air body (9) then drop in the piston and needle assembly.

15. Mount the 007 Buna o-ring {17}[16] on the end of the needle and slide it down into the groove in the end of the lower air body.
16. Slide the end cap (8) onto the needle up to the lower air body, place the spring {20}[18] on top of the piston, and assemble the two air bodies using two machine screws {22}[21] that thread into the end cap. Tightening using a 3/32" Allen key.

Note: Be sure the air holes are lined up on the same face and will align with the fluid inlet of the fluid section (4).

3.6.3 Fluid Section

1. Screw in the four standoffs (7) and tighten with soft tip pliers.
2. Drop the packing (5) into the fluid section (4), and screw in the packing nut (6) but leave finger tight until assembled with the air section.
3. Mount the 007 Kalrez o-ring {16}[15] on the seat (2) and push the seat into the bottom of the fluid section. When inserting the seat, work the o-ring into the fluid body to prevent the edge from shearing.
4. Thread the needle adapter (1) onto the fluid body and tighten with an adjustable wrench.
5. Place the small washer {15}[14] into the end of the needle adapter (1), then thread the luer adapter {14}[13] onto the needle adapter and tighten with an adjustable wrench.

3.6.4 Assemble Section

1. **FC300 and FC300-C Only**: Back out the stroke adjust bolt {13} by turning it counter clockwise until the end of its travel.
2. **FC300-MC Only**: Be sure the micrometer adjustment [12] is backed out far enough so at least the number 1 can be seen on the midsection [D].
3. Apply a small amount of silicone grease to the end of the needle (3) and insert it into the packing nut (6). Slide the two sections together.
4. Align the air holes of the air section on the same face as the fluid inlet of the fluid section then connect the sections using the two machine screws {21}[19], tightening them down evenly using a 3/32" Allen key.
5. Using the tip of a 3/32" Allen key, tighten the packing nut (6).

3.7 Setting Micrometer to Zero (FC300-MC)

When assembling the valve, it will be necessary to re-calibrate the micrometer adjust back to the zero position.

1. Using the micrometer wrench [A], insert the inside tip of the small end into the orifice of the midsection [D] and rotate it clockwise until the numbered centerline is displayed on a side that can most easily be viewed by an operator.

Note: Valves are supplied from the factory with the center line located 90' left of the fluid inlet.

2. Turn the dial [C] clockwise until the end [F] hits the piston (11).
3. Using soft tip pliers, hold the knurled end of the dial tightly and loosen the screw [B] using a flat head screwdriver.

Note: Loosen the screw 3-4 turns only. It is not necessary to fully remove the screw.

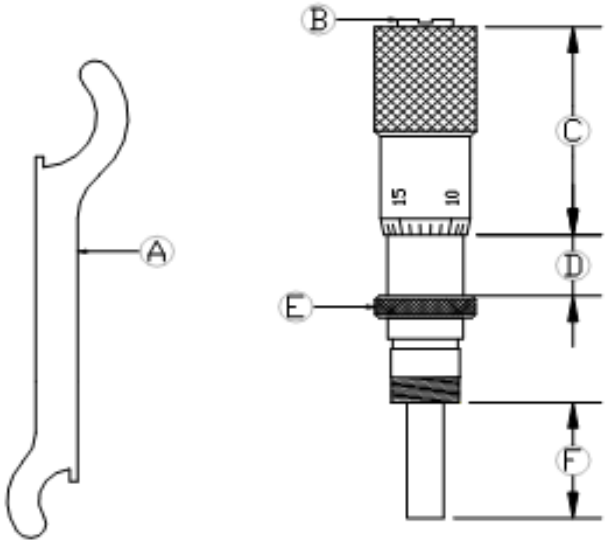
4. Using a soft dead blow hammer, tap the dial of the micrometer adjust to unlock it from the mid-section. The dial will now spin freely.
5. Rotate the dial to align the zero mark of the dial with the numbered centerline of the midsection and press down firmly to secure the dial in place.
6. Hold the dial securely in one hand maintaining alignment with the zero mark and numbered centerline, then carefully tighten the screw using the flat head screwdriver to lock the micrometer in the zero position.

3.7.1 Micrometer Adjustment Breakdown

Figure 6: Micrometer Section Key

Reference Letter	Section Description
A	Micrometer Wrench
B	Top Screw
C	Dial
D	Micrometer Midsection
E	Collar
F	Micrometer End

Figure 7: Micrometer Adjustment Breakdown



3.8 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.

3.8.1 FC300 Spare Parts Kit

The spare parts kit for this valve, product number **FC3-SP,** includes the following components.

Figure 8: Contents of FC300 Spare Parts Kit

Qty	Part Number	Description
1	V327	Seat
1	V328	Needle
1	V330	Packing, Teflon
2	VLV-116B	O-ring, Buna
2	VLV-011B	O-ring, Buna
1	VLV-007K	O-ring, Kalrez®
1	VLV-007B	O-ring, Buna
1	V125	Washer

3.8.2 FC300-C Spare Parts Kit

The spare parts kit for this valve, product number **FC3-C-SP,** includes the following components.

Figure 9: Contents of FC300-C Spare Parts Kit

Qty	Part Number	Description
1	114-2004	Seat
1	114-5537	Needle
1	114-2616	Packing, Teflon
2	VLV-116B	O-ring, Buna
2	VLV-011B	O-ring, Buna
1	VLV-007K	O-ring, Kalrez®
1	VLV-007B	O-ring, Buna
1	V125	Washer

3.8.3 FC3-MC-SP Spare Parts Kit

The spare parts kit for this valve, product number **FC3-MC-SP,** includes the following components.

Figure 10: Contents of FC300-MC Spare Parts Kit

Qty	Part Number	Description
1	V227	Seat
1	V228	Needle
1	V330	Packing, Teflon
2	VLV-116B	O-ring, Buna
2	VLV-007B	O-ring, Buna
1	VLV-007K	O-ring, Kalrez®
1	V125	Washer
1	PT17184	Micrometer Wrench

3.9 Drawings

Figure 11: Drawing 112-0728 (FC300)

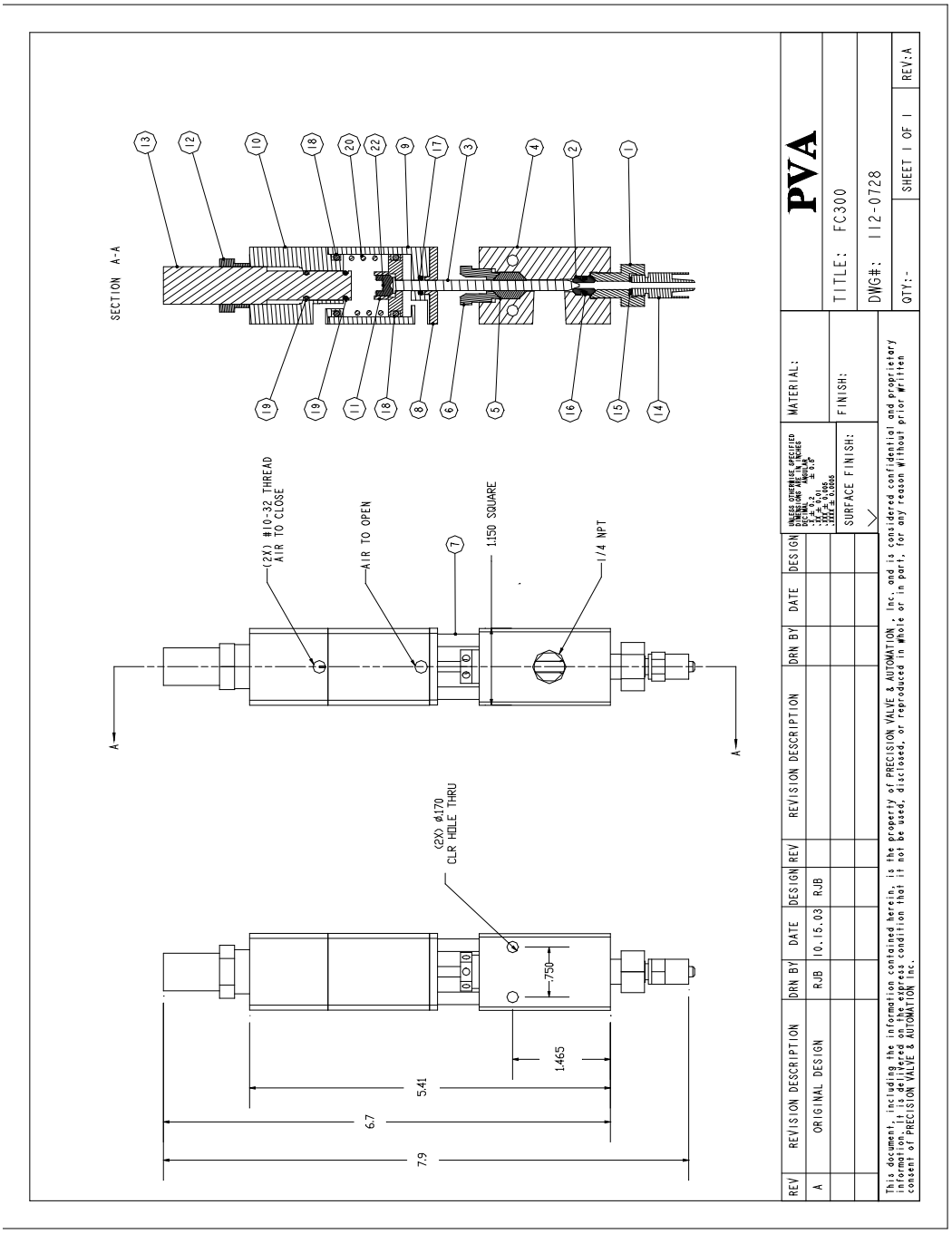


Figure 12: Drawing 112-0728 (FC300-C)

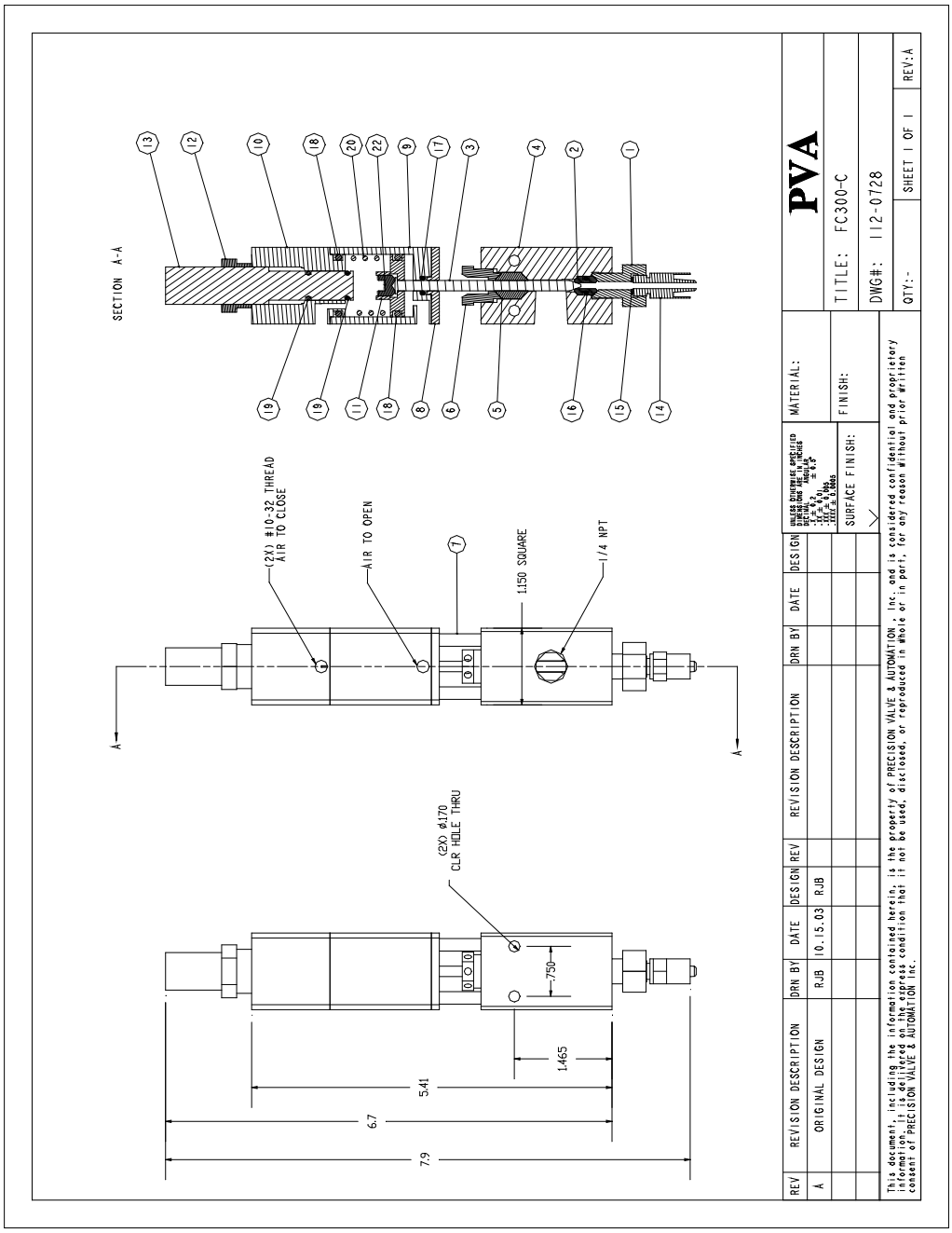
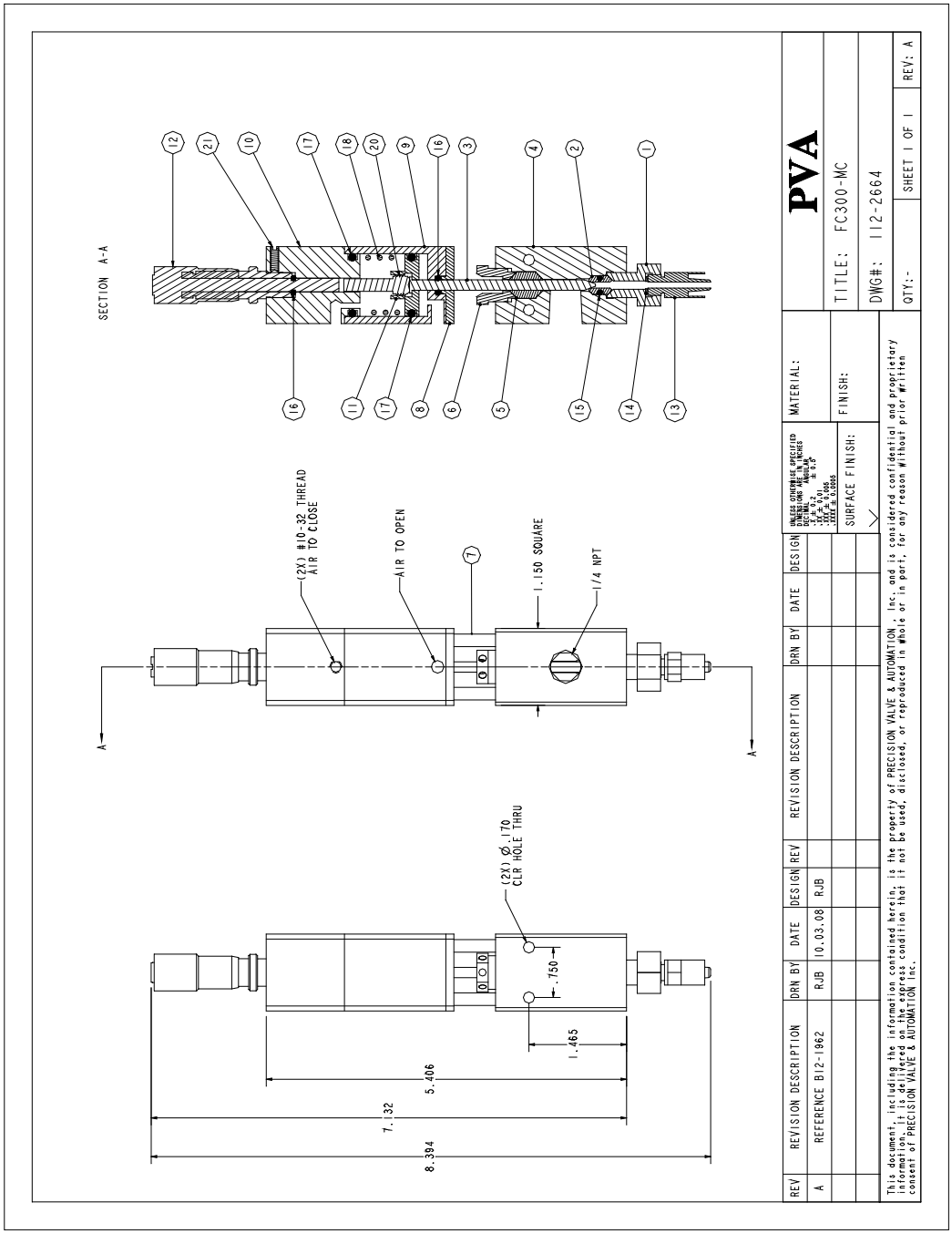


Figure 13: Drawing 112-2664 (FC300-MC)



3.10 Bill of Materials

3.10.1 FCS300 (B12-0481)

Figure 14: Bill of Materials for FC300

Item	Part Number	Description	Quantity
1	V326	Needle Adapter	1
2	V327	Seat	1
3	V328	Needle	1
4	V329	Fluid Section	1
5	V330	Packing	1
6	V331	Packing Nut	1
7	V075	Standoff	4
8	V222	End Cap	1
9	V223	Lower Air Body	1
10	V225	Upper Air Body	1
11	V224	Piston	1
12	V226	Lock Nut	1
13	V227	Stroke Adjust	1
14	V300	Luer Adapter	1
15	V125	Washer	1
16	VLV-007K	O-ring, Kalrez®	1
17	VLV-007B	O-ring, Buna	1
18	VLV-116B	O-ring, Buna	2
19	VLV-011B	O-ring, Buna	2
20	V080	Spring	1
21	SH5-40x2.25	Fastener, SHCS	4
22	V079	Set Screw	1
23	V326	Needle Adapter	1

3.10.2 FC300-C (B12-0480)

Figure 15: Bill of Materials for FC300-C

Item	Part Number	Description	Quantity
1	V326	Needle Adapter	1
2	114-2004	Seat, Carbide	1
3	114-5537	Needle, Carbide	1
4	V329	Fluid Section	1
5	114-2616	Packing, Special	1
6	V331	Packing Nut	1
7	V075	Standoff	4
8	V222	End Cap	1
9	V223	Lower Air Body	1
10	V225	Upper Air Body	1
11	V224	Piston	1
12	V226	Lock Nut	1
13	V227	Stroke Adjust	1
14	V300	Luer Adapter	1
15	V125	Washer	1
16	VLV-007K	O-ring, Kalrez®	1
17	VLV-007B	O-ring, Buna	1
18	VLV-116B	O-ring, Buna	2
19	VLV-011B	O-ring, Buna	2
20	V080	Spring	1
21	SH5-40x2.25	Fastener, SHCS	4
22	V079	Set Screw	1

3.10.3 FC300-MC (B12-1962)

Figure 16: Bill of Materials for FC300-MC

Item	Part Number	Description	Quantity
1	V326	Needle Adapter	1
2	V327	Seat	1
3	V328	Needle	1
4	V329	Fluid Section	1
5	V330	Packing	1
6	V331	Packing Nut	1
7	V075	Standoff	4
8	V222	End Cap	1
9	V223	Lower Air Body	1
10	114-8267	Upper Air Body	1
11	V224	Piston	1
12	01423	Micrometer Head	1
13	V300	Luer Adapter	1
14	V125	Washer	1
15	VLV-007K	O-ring	1
16	VLV-007B	O-ring	2
17	VLV-116B	O-ring	2
18	V080	Spring	1
19	SH5-40x2.25"	Cap Screw	4
20	114-8268	Set Screw	1
21	01516	Set Screw	1

4.Troubleshooting

Problem	Possible Cause	Corrective Action
Valve does not cycle	Air pressure to air section is too low	Increase air pressure to 60-100 psi
	Packing nut is too tight	Loosen packing nut until valve just begins to cycle, retighten
	Stroke adjustment bolt (**FC300/FC300-C**) or micrometer adjustment (**FC300-MC)** is bottomed out	Back out stroke adjustment bolt (**FC300/FC300-C**) or micrometer adjustment (**FC300-MC**) by turning it counter-clockwise
	Material is cured in the valve	Disassemble and clean valve
	Valve was assembled without lubricating the O-ring seals	Disassemble valve, lubricate seals and reassemble
Material leaks from valve tip	Packing nut is too tight	Loosen packing nut
	Needle and/or seat are worn	Replace parts as necessary
	Air bubble is trapped in fluid body or in dispense needle	Flip valve upside down and cycle until air bubbles are removed
Valve leaks from mid-section	Packing nut is loose	Tighten packing nut until snug
	Packing is worn	Replace packing
Valve does not dispense anything	Fluid pressure is too low	Increase fluid pressure
	Material is cured in fluid section	Disassemble and clean valve
	Stroke adjustment bolt is set too low (**FC300/FC300-C**) or micrometer adjustment bolt is set too close to zero (**FC300-MC**)	Back out stroke adjustment bolt (**FC300/FC300-C**) or micrometer adjustment (**FC300-MC**) by turning it counterclockwise
Air bubbles in fluid	Valve not properly purged	Flip valve upside down and cycle until air bubbles are removed
	Problem with fluid delivery system	Diagnose and repair
Dispense rate too fast	Stroke Adjustment bolt is set out too far (**FC300/FC300-C**) or micrometer adjustment set too close to the zero mark	Turn stroke adjustment bolt (**FC300/FC300-C**) or micrometer (**FC300-MC**) clockwise
Dispense rate too slow	Stroke Adjustment bolt is set in too far (**FC300/FC300-C**) or micrometer adjustment is set too close to the zero mark (**FC300-MC**)	Turn stroke adjustment bolt (**FC300/FC300-C**) or micrometer adjustment (**FC300-MC**) counterclockwise

5. 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 are 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 Technical Support 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: _____

6. Table of Figures