

DV Series Dispense Valves

3A1792D

EN

Dispense valves for controlling material flow of adhesives, sealants, and other materials that are compatible with the wetted parts of the valve. For professional use only.

Not approved for use in explosive atmosphere locations.



Important Safety Instructions

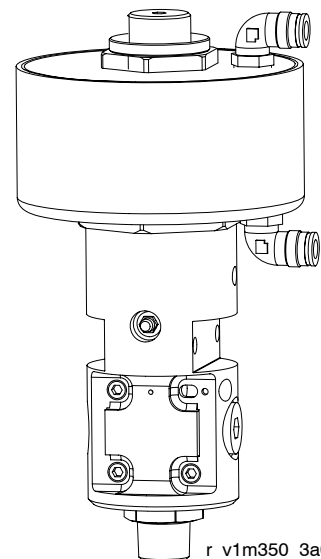
Read all warnings and instructions in this manual. Save these instructions.

V1M350

Ambient/Temperature Conditioning, 3/4 in. npt Dispense Valve

5000 psi (35 MPa, 345 bar) Maximum Working Pressure

See page 5 for models and approvals.






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Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

 WARNING	
	<p>SKIN INJECTION HAZARD</p> <p>High-pressure fluid from dispensing device, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. Get immediate surgical treatment.</p> <ul style="list-style-type: none"> • Do not point dispensing device at anyone or at any part of the body. • Do not put your hand over the fluid outlet. • Do not stop or deflect leaks with your hand, body, glove, or rag. • Follow the Pressure Relief Procedure when you stop dispensing and before cleaning, checking, or servicing equipment. • Tighten all fluid connections before operating the equipment. • Check hoses and couplings daily. Replace worn or damaged parts immediately.
	<p>BURN HAZARD</p> <p>Equipment surfaces and fluid that's heated can become very hot during operation. To avoid severe burns:</p> <ul style="list-style-type: none"> • Do not touch hot fluid or equipment.

⚠️ WARNING



FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in **work area** can ignite or explode. To help prevent fire and explosion:

- Use equipment only in well ventilated area.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).
- Keep work area free of debris, including solvent, rags and gasoline.
- Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.
- Ground all equipment in the work area. See **Grounding** instructions.
- Use only grounded hoses.
- Hold gun firmly to side of grounded pail when triggering into pail.
- If there is static sparking or you feel a shock, **stop operation immediately**. Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.



TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.

- Read MSDSs to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.

WARNING



EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Data** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure. Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.



PERSONAL PROTECTIVE EQUIPMENT

You must wear appropriate protective equipment when operating, servicing, or when in the operating area of the equipment to help protect you from serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

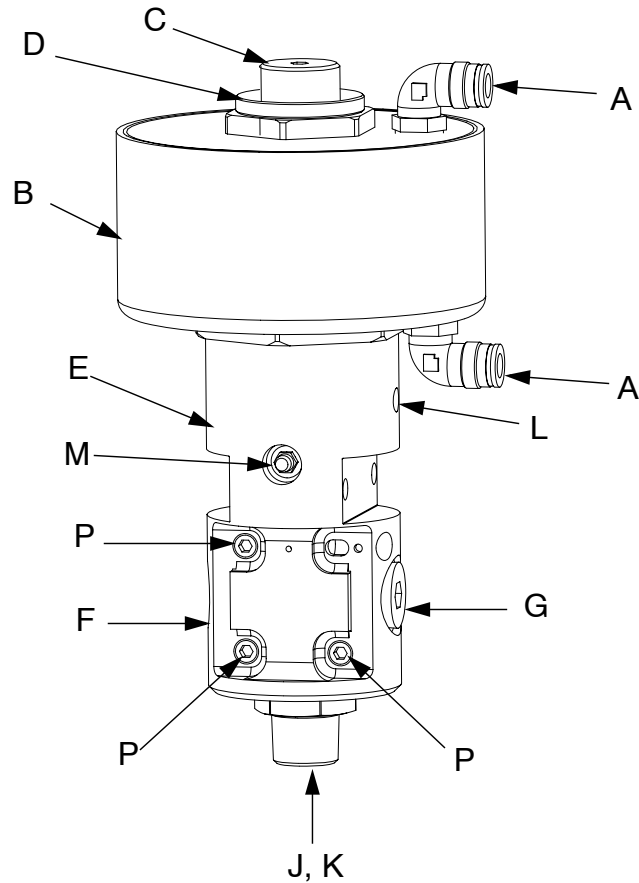
Models

3/4 in. npt Dispense Valve

First and Second Digit	Third Digit		Fourth Digit			Fifth Digit		Sixth Digit
		Type		Air Open /Air Close	Stroke Adjustment		Heat	
V1	M	Ball / Seat	3	No Spring	Adjustable	5	Ambient/Temperature Conditioning †	0

† Use existing fluid ports in fluid section for temperature conditioning. See page 9 for instructions.

Component Identification



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FIG. 1: 3/4 in. npt Dispense Valve - Typical Components

Key:

- A Air Connections
- B Air Section
- C Travel Adjuster
- D Lock Nut
- E Fluid Section
- F Material Inlet
- G Recirculation Port Plug
- J Material Outlet
- K Threaded Outlet Fitting
- L Weep Holes
- M Grease Zerk Fittings
- P Temperature Conditioning Port

Theory of Operation

The valve uses the air-opened, air-closed mode of operation, therefore, it uses a four-way exhausting solenoid to control the piston inside the valve.

The valve has two npt fluid inlet ports. One fluid inlet port is the supply port, feeding material into the dispense valve. Use the other fluid inlet port to recirculate material through the valve or leave it plugged with the supplied npt plug. The fluid outlet port dispenses material through a dispense nozzle in regulated amounts.

The air-operated piston, rod, and tip move at the same time. When air moves the piston, rod, and tip from its seat it opens the fluid outlet port. When air pushes the piston, rod, and tip into its seat it closes the fluid port.

The system provides pressurized fluid to the valve and the system air controls open and close the valve controlling the fluid flow.

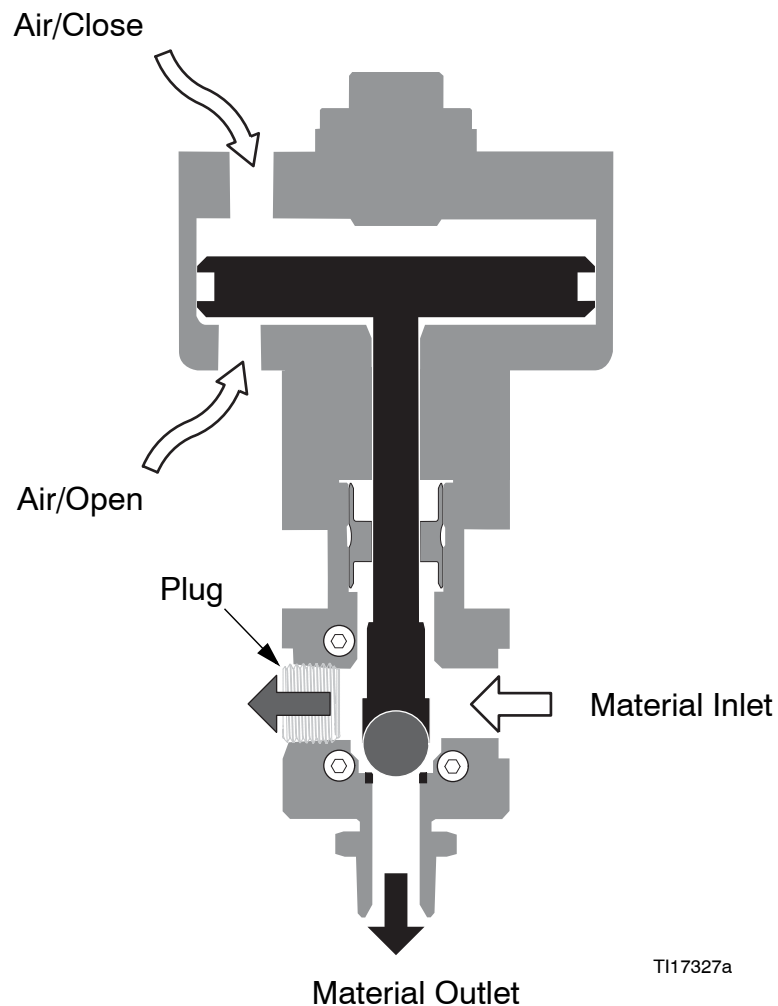


FIG. 2: DV Series Theory of Operation

Setup

Grounding



The equipment must be grounded. Grounding reduces the risk of static shock by providing an escape wire for the electrical current due to static build up.

The following grounding instructions are minimum requirements for a basic dispensing system. The specific system being used may include other equipment or objects that must be grounded. Check local electrical codes for detailed grounding instructions.

Pump: use ground wire and clamp (supplied with pump). Connect ground clamp to a true earth ground as shown in separate pump manual.

Air and fluid hoses: use only electrically conductive hoses with a maximum of 100 ft (30.5 m) combined hose length to ensure grounding continuity. Check the electrical resistance of your air and fluid hoses at least once a week. If the total resistance to ground exceeds 25 megohms, replace the hose immediately.

NOTE: Use a meter that is capable of measuring resistance at this level.

Air compressor: follow manufacturer's recommendations.

Dispense valve: ground through connection to a properly grounded fluid hose and pump.

Fluid supply container: follow local code.

Object being sprayed: ground the object being sprayed according to local code.

Solvent pails used when flushing: follow local code. Use only conductive metal pails, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts grounding continuity.

To maintain grounding continuity when flushing or relieving pressure: hold metal part of the dispense valve firmly to the side of a grounded metal pail, then trigger the valve.

Flush Before Using Equipment

The equipment was tested with lightweight oil, which is left in the fluid passages to protect parts. To avoid contaminating your fluid with oil, flush the equipment with a compatible solvent before using the equipment.

Installation



The dispense valves have multiple mounting hole configurations (see **Dimensions and Mounting**, page 22), which make them ideal for use with robotic equipment or multiple manifold high production operations.

1. Inspect dispense valve for shipping damage. If there is damage, notify shipping carrier immediately.
2. Install compatible accessories. For a list of accessories and installation instructions, see **Accessories**, page 21.

NOTE: The outlet collar (J) also holds in the seat. Follow **Pressure Relief Procedure**, page 10, before changing any spray or dispense tip.

3. Securely attach the dispense valve to its mounting fixture using socket head cap screws; see **Dimensions and Mounting**, page 22.
4. Connect air lines to the dispense valve:

NOTICE

Only use air fittings that are rated at a temperature equal to or higher than the operating temperature of the fluid dispensing system. Lower rated air fittings could melt and cause damage to the dispense valve.

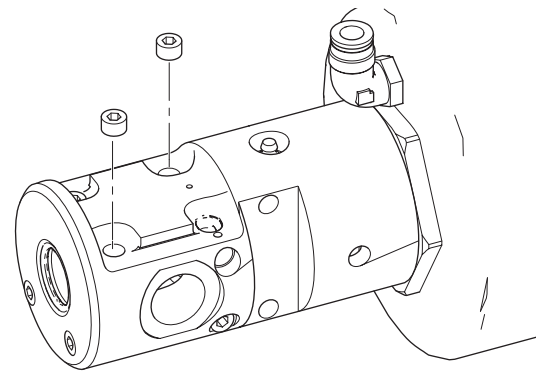
- a. See **Technical Data**, page 23, for maximum operating air pressure.
- b. Connect air line to air-to-open air inlet in air section (B). See FIG. 2, page 7.
- c. Connect air line to air-to-close air inlet in air section (B). See FIG. 2, page 7.

5. Connect fluid line to npt fluid inlet (F) in valve body. If desired, remove plug from other inlet (G) and connect fluid return line for circulation systems. See **Technical Data**, page 23, for maximum operating fluid pressure.
6. Check each fitting for firmness to avoid pressure leakage from the dispense valve.

Ambient/Temperature Conditioning

Use temperature conditioning ports to circulate temperature conditioning fluid through the fluid section and heat material.

1. Identify which two ports are accessible to temperature conditioning hoses.
2. Remove plugs from two temperature conditioning ports.
3. Connect inlet and outlet hoses to temperature conditioning ports.



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FIG. 3: Temperature Conditioning Ports

Adjust Stroke

Adjust the distance that the dispense valve opens to restrict the flow of material through the tip and seat. See FIG. 4.

1. Loosen the lock nut (R).
2. Cycle air pressure to close valve.
3. Turn the adjuster knob (D) clockwise until the valve is held closed.
4. Cycle air pressure to open the valve. Ensure material does not dispense.
5. Slowly open the adjuster knob (D) and then cycle the air pressure until the desired flow is reached.
6. Tighten lock nut (R) to hold the adjuster knob (D) in place.

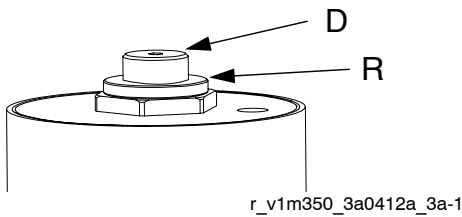


FIG. 4: 3/4 in. Valve

Pressure Relief Procedure

To reduce the risk of serious injury, use this procedure when shutting off the dispense valve, and before checking or adjusting any part of the system.						

This procedure describes how to relieve pressure from the dispense valve. See the supply system manual for instructions on relieving pressure from the entire system.

1. Shut off material supply.
2. Actuate the valve into a grounded metal waste container to relieve the fluid pressure.
3. Relieve all air pressure in the air lines.
4. If the valve nozzle or fluid hose is clogged or if pressure has not been fully relieved after following the steps above, **VERY SLOWLY** loosen the npt inlet fitting from the applicator fluid body or hose end coupling to relieve pressure gradually, then loosen completely. Clear hose or nozzle obstruction.

Maintenance

Inspect the dispense valve, material, and air hoses at least once every two weeks. Inspect for leakage and other visible damage.

The following table lists recommended maintenance procedures and frequencies. A typical application is a valve mounted on a robot dispensing a moderately abrasive sealant.

Table 1: Mechanical

Task	Weekly	Monthly or 30,000 cycles
Inspect for leaks	✓	
*Check hoses for wear	✓	
*Check/tighten fluid connections	✓	
*Check/tighten air connections	✓	
Check stroke adjustment	✓	
Lube packings		✓

* Assumes movement from automation.

Packing Lubrication



This valve has a primary seal, a pressurized grease area, and a secondary seal. The key to long seal life is that the secondary seal only has to seal grease.

When dispensing filled materials this grease should be refilled once a month. Complete the following procedure to avoid pushing grease into the fluid stream

1. **Relieve the system pressure**, page 10.
2. Remove one grease zerk fitting (111).

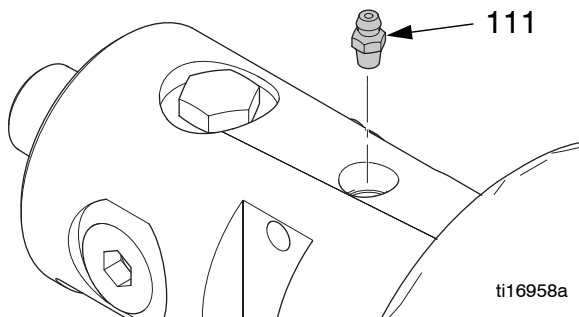


FIG. 5

3. Use a grease gun (part no. 551189) to pump a high quality grease (part no. 115982, high temperature moisture free) into the zerk fitting (111) until fresh grease comes out the other side.
4. Reinstall the grease zerk fitting (111) and give the valve one more shot of grease to pressurize the cavity through the grease zerk fitting (111).

NOTE: Grease can enter the fluid section if more than one shot is triggered after the grease fitting or plug has been replaced.

Factors Affecting Valve Life

The maintenance tables should be used as a guideline for frequency of maintenance tasks. Additional factors that could affect valve life include the following:

- **Process Fluid** - Abrasive or fiber filled fluids are much harder on seals, shafts, and seats than non-abrasive fluids such as oil.
- **Pressure drop across the valve seat** - As the valve opens or closes, the fluid is accelerated to a high velocity at the needle/seat contact area. The rate of wear at the valve will be much greater at 3000 psi than at 1000 psi. Changing nozzle or tip size can have a substantial affect on wear.
- **Number of cycles** - This has a much greater affect on valve wear than number of gallons. If you can do the same job with fewer on/off cycles, the valve will last longer.
- **Speed of actuation** - Opening and closing the valve quickly will increase needle and seat life. Use short air lines after the solenoid to improve open and close speed. Avoid long air tube runs after the solenoid.
- **Air pressure** - This is what provides the force to hold the carbide ball against the carbide seat to seal against fluid pressure.

NOTE: Any leakage on these hard parts, at high pressure, will quickly “worm-hole” the parts and cause the valve to wear out sooner.

Troubleshooting



Problem	Cause	Solution
Air leaks from automatic dispense valve.	Loose air connections.	Check air connections.
	Worn o-rings.	Replace o-rings in air housing.
	Loose end cap.	Tighten end cap.
Material leaks from front of automatic dispense valve.	Seal, tip, or seat is worn.	Replace seat seals, tip, and seat.
	Obstruction inside dispense valve.	Remove nose piece. Check and replace if necessary, cartridge, tip, and seat.
	Worn tip.	Check and replace tip, if necessary. If replacing tip, it is recommended that you also replace the seat.
	Worn seat.	Check and replace or reverse seat if necessary. Replace tip with seat.
Material leaks from automatic dispense valve body.	Seals not installed correctly.	Check cartridge seals and replace cartridge and rod.
	Seals are worn.	
Automatic dispense valve does not shut off.	Loose air connections	Check air connections.
	Worn needle-seat interface.	Replace cartridge, tip, and seat.
	Broken piston or debris in air cylinder.	Disassemble dispense valve. Check and replace, if necessary, piston, piston rod, and o-rings.
Automatic dispense valve does not open or dispense material.	Loose air connections.	Check air connections.
	Broken rod, piston, or tip.	Disassemble dispense valve. Check and replace, if necessary, piston, piston rod, and o-rings.

Repair



If the unit is hot, determine whether or not you can service the unit after it has cooled down. Some materials, like polyurethanes, may cure permanently when cooled and exposed to air, preventing you from disassembling the dispense valve. If you are working with such a material, service the unit while the material is at a temperature where the material is soft enough to work with. If the material can be reheated at a later time, you can service the unit after it has cooled, reheating the material as necessary.

Perform this procedure before servicing the dispense valve.

1. Make sure material flow has been shut off.
2. **Relieve the system pressure**, page 10.
3. Make sure system air has been shut off.
4. If the material in the dispense valve can be reheated, wait for the dispense valve to cool thoroughly before servicing it.

If the material in the dispense valve cures permanently when cooled and/or exposed to air, service the unit while the material is at a temperature where the material is soft enough to work with.

5. Disconnect the air section to repair the valve. See **Disconnect**.

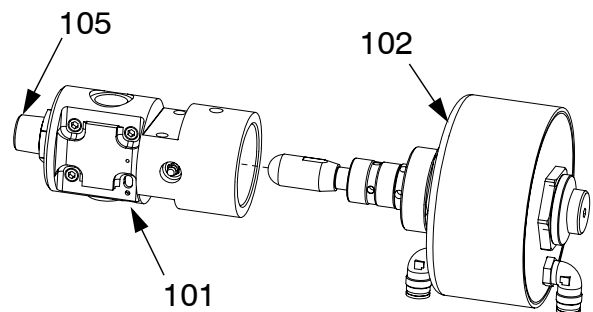
Disconnect

NOTE: Always replace o-rings after the valve has been disassembled.



The u-cup cartridge, fluid section o-rings, and seat seal can be replaced without disconnecting the valve from the mounting equipment, or material hoses.

1. Follow steps 1 through 5 from **Repair**.
2. If the fluid section (101) is not mounted, place fluid section in a vise. Place a wrench on the bottom air housing (102) flats and disconnect the fluid and air sections.
3. If necessary, replace the old air section with a new air section to reduce downtime. Bring the old air section to a work bench for repair.



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FIG. 6

Connect

1. If the fluid section is not mounted, place outlet fitting (105) in a vise.
2. Tighten air section to fluid section (101). Torque to 30 ft-lbs (41 N•m).

Disassembly

1. Follow **Disconnect** instructions, page 15.
2. Remove the outlet fitting (105) and o-ring (105a).

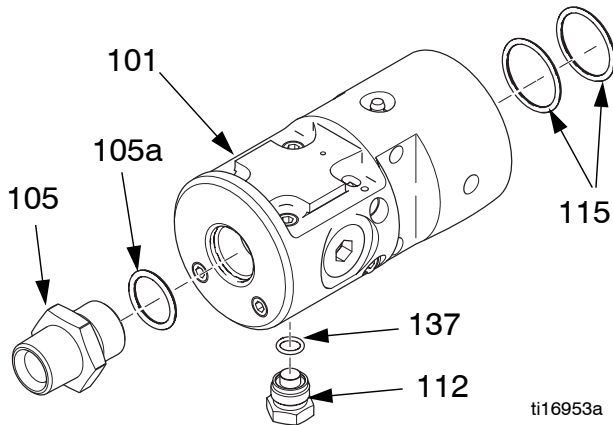


FIG. 7

3. Remove plug (112) and o-ring (137).
4. Use an o-ring pick to remove the two o-rings (115) from the fluid housing (101).
5. Use a wrench on the air cap (104) flats and remove from the air housing (102).

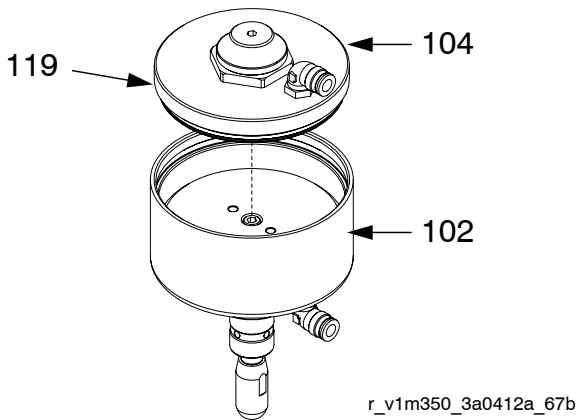


FIG. 8

6. Place a wrench on the ball housing (106) flats and 6 mm Allen wrench in the top of the piston rod (103). Remove the ball housing from the piston rod.

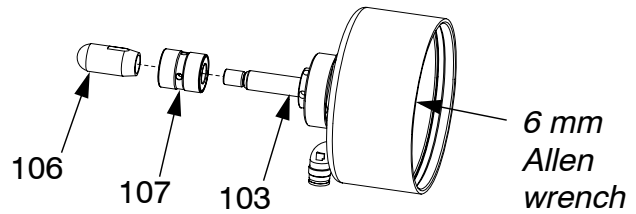


FIG. 9

7. Use a rubber mallet to drive the piston rod (103) through the u-cup cartridge (107).
8. Remove the piston from the air housing (102). Inspect the piston, piston rod, and air housing for damage. Replace if necessary.
9. Remove retaining ring (113). Loosen the locknut (109) and unthread the travel adjuster (108).
10. Remove the o-rings (117, 118, 119, and 120).

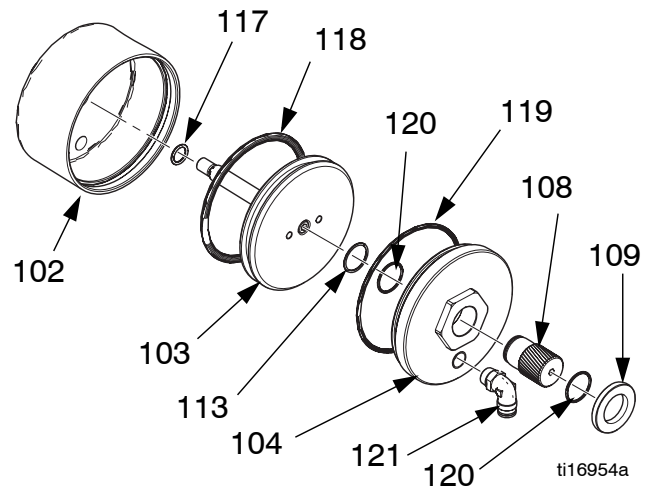
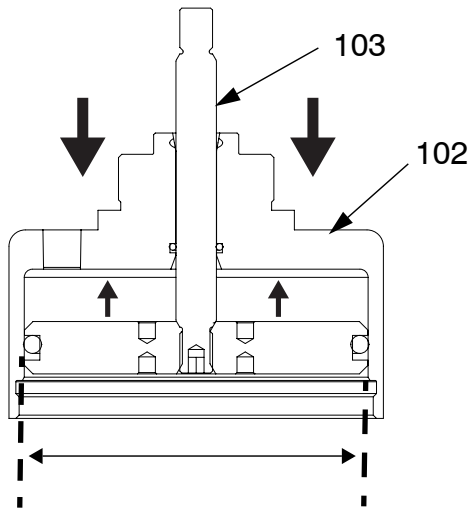


FIG. 10

Assembly

1. Install new o-rings (118, 117) on the piston (103) and in the air housing (102). See FIG. 10.
2. Apply a thin coat of grease to the piston o-ring (118) and inside wall of the air housing (102).
3. Place the top of the piston assembly (103) on a surface smaller than the piston diameter. Press the air housing (102) down over the piston assembly.



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FIG. 11

4. Install new o-ring (120) in the end cap (104). Apply with grease. See FIG. 10.
5. Thread the travel adjuster (108) in the end cap (104). Place second o-ring (120) over travel adjuster threads and tighten with the locknut (109) retaining ring (113) and o-ring (120). See FIG. 10.
6. Apply grease on the piston rod and install the u-cup cartridge (107) against the air housing (102), with the open end of the u-cups facing away from the air section. See FIG. 9.
7. Wipe grease off the piston rod threads. Apply purple anaerobic adhesive (supplied with repair kit) on the male and female threads, then install ball housing (106). Torque to 40 ft-lbs (54 N•m). See FIG. 9.

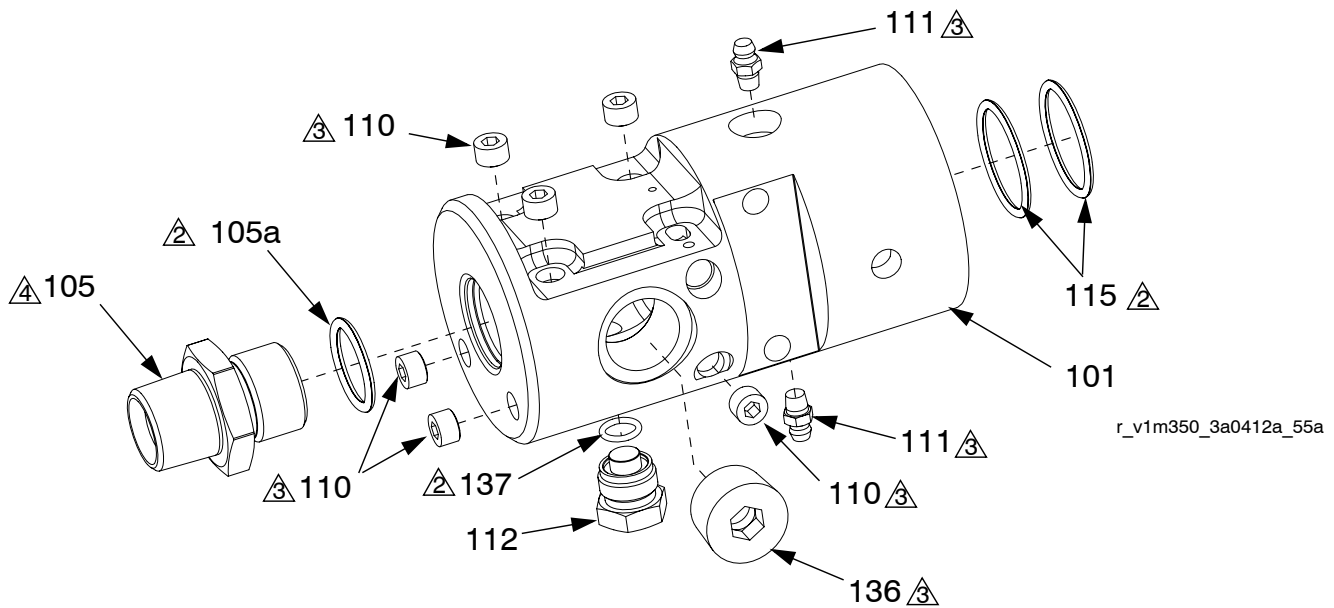
NOTICE

To prevent the ball housing from loosening, allow the anaerobic adhesive to set for 24 hours before running the valve.

8. Install o-ring (119) onto air cap (104). Tighten air cap onto air housing (102). Torque to 30 ft-lbs (41 N•m).
9. Install two new o-rings (115) inside the fluid housing. Apply with grease. See FIG. 7.
10. Install new o-ring (137) and reinstall plug (112).
11. Install new o-ring (105a) and reinstall outlet fitting (105). Torque to 30 ft-lbs (41 N•m).
12. Follow **Connect** instructions, page 15.

Parts

3/4 in. npt Fluid Sections



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Apply a thin coat of grease to surface.

Torque to 30 ft-lbs (41 N•m).

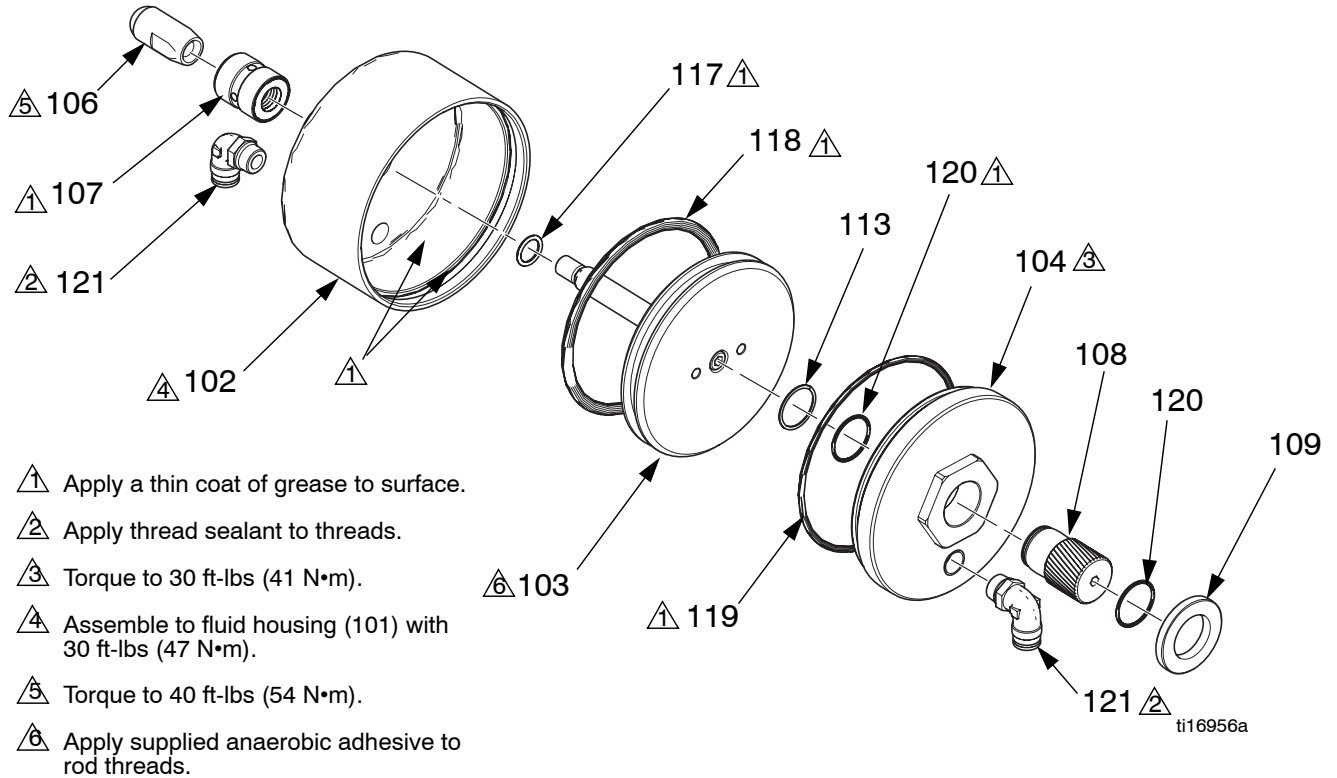
Apply thread sealant to threads.

3/4 in. npt Fluid Section Parts

Ref.	Part	Description	Quantity
101†	--	HOUSING, fluid section, 3/4 in.	1
105	24H542	FITTING, carbide seat, outlet 3/4 in.; includes 105a	1
105a	--	O-RING, 912, chemical resistant, fluoroelastomer	1
110†	--	PLUG, pipe, headless	6
111†	100846	FITTING, lubrication, st	2
112†	198241	PLUG, port, pressure	1
115†	--	O-RING, 124, chemical resistant, fluoroelastomer	2
136†	--	PLUG, socket, hex, npt, 3/4 in.	1
137†	--	PACKING, o-ring	1

† Included in fluid section Repair Kit 24H521.

3/4 in. npt Air Section



Ref.	Part	Description	Quantity
102★	--	HOUSING, air section, 3/4 in.	1
103★	--	PISTON, rod, assy, 3/4 in.	1
104★	--	CAP, air, adjustable, 3/4 in.	1
106	24H539	BALL, housing, assy, 3/4 in.	1
107	24H537	CARTRIDGE, seal, 3/4 in.; ambient, with u-cup seals	1
108★	--	ADJUSTER, travel, 3/4 in.	1
109★	--	NUT, lock, adjustment, 3/4 in.	1
113★	--	RING, retaining, external, sst	1
117★	--	O-RING, fluoroelastomer	1
118★	--	O-RING, fluoroelastomer	1
119★	--	O-RING, fluoroelastomer	1
120★	--	O-RING, fluoroelastomer	2
121	--	FITTING, elbow, male, swivel	2

★ See *Repair Kits*, page 20.

Repair Kits

Air Section Repair Kits

See **Maintenance** on page 11 and **Repair** on page 15 for appropriate kit installation procedures.

Kit	Description	Reference Numbers													
		102	103	104	108	109	113	105a	115	117	118	119	120	121	137
24H512	Complete o-ring kit							✓	✓	✓	✓	✓	✓	✓	✓
24H515	Piston, piston rod, and complete o-ring kit		✓					✓	✓	✓	✓	✓	✓	✓	
24H524	Air housing with fitting	✓						✓	✓	✓	✓	✓	✓	✓	
24H553	Air cap with fitting and o-ring			✓								✓	✓	✓	
24H554	Travel adjuster and lock nut				✓	✓	✓						✓		

Fluid Section Repair Kit, 24H521

See parts list on page 18.

Accessories

Before installing any accessories, follow steps 1 through 5 from **Repair**, page 15.

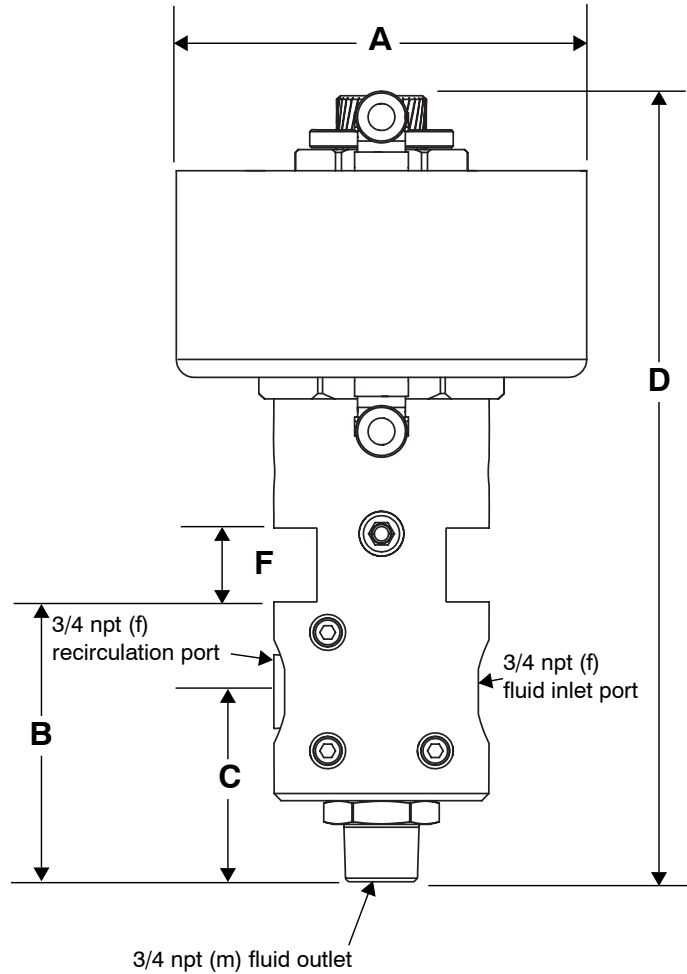
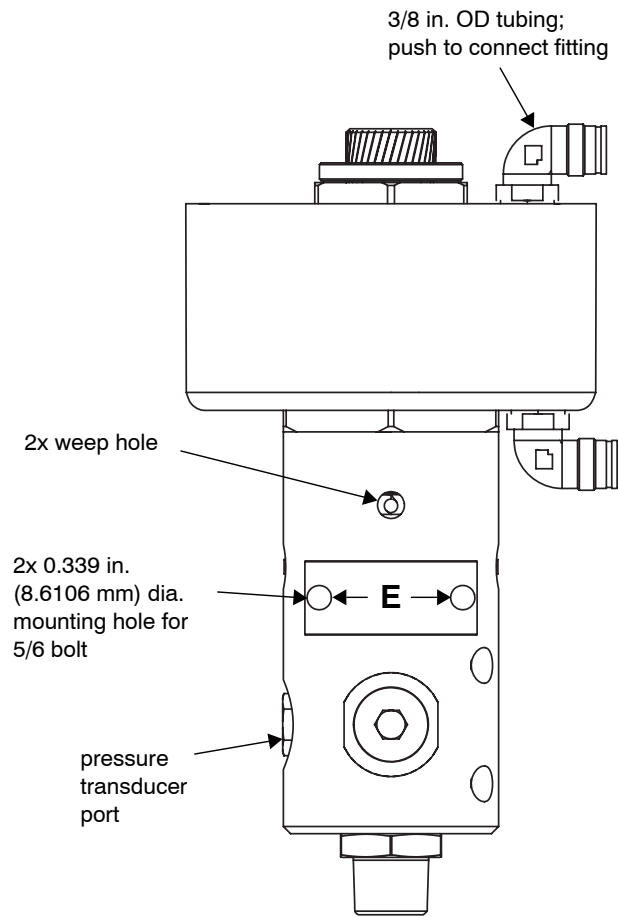
Grease, 115982

High temperature moisture free grease.

Grease Gun, 551189

Use to pump grease into the zerk fitting.

Dimensions and Mounting



Ref.	Dimension
A	5.72 in. (145.288 mm)
B	3.90 in. (99.06 mm)
C	2.650 in. (67.31 mm)

Ref.	Dimension
D	10.955 in. (278.257 mm)
E	2.0 in. (50.8 mm)
F	1.03 in. (26.162 mm); mounting slot; 2x

Technical Data

Maximum operating air pressure	100 psi (0.7 MPa, 7.0 bar)
Maximum fluid working pressure	5000 psi (35 MPa, 345 bar)
Maximum fluid operating temperature	180°F (82°C)
Weight	15.1 lb (6.85 kg)
Wetted parts	Stainless steel, tungsten carbide, chemical resistant fluoroelastomer rubber, UHMWPE

Graco Standard Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

FOR GRACO CANADA CUSTOMERS

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Graco Information

For the latest information about Graco products, visit www.graco.com.

TO PLACE AN ORDER, contact your Graco distributor or call to identify the nearest distributor.

Phone: 612-623-6921 **or Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

All written and visual data contained in this document reflects the latest product information available at the time of publication. Graco reserves the right to make changes at any time without notice.

For patent information, see www.graco.com/patents.

Original instructions. This manual contains English. MM 3A1792

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