## **Instructions – Parts List**



## AIR-OPERATED Fluid Pressure Regulator 308098 Rev.H

100 psi (0.7 MPa, 7 bar) Maximum Fluid and Air Pressure

**Part No. 235287** Standard Fluid Pressure Regulator For use with low pressure air spray systems.

#### Part No. 224531

PRO<sup>™</sup> 4600 Fluid Pressure Regulator For use with the PRO 4600 air spray gun. Includes standard fluid regulator 235287 and a fluid tube assembly to connect to the PRO 4600 gun manifold.

#### Part No. 236854

PRO<sup>™</sup> Auto Xs and PRO<sup>™</sup> 5500 Fluid Pressure Regulator For use with the PRO Auto Xs and PRO 5500 air spray gun. Connects directly to the PRO Auto Xs and PRO 5500 spray gun fluid inlet.



**Read warnings and instructions.** See page 2 for **Table of Contents.** 



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# **Table of Contents**

## **Symbols**

Warning Symbol

## WARNING

This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

### **Caution Symbol**

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This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

# A WARNING



### EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture, malfunction or start unexpectedly and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Use this equipment only in low pressure, air spray systems.
- Do not exceed the maximum working pressure of the lowest rated system component. This equipment has a **100 psi (0.7 MPa, 7 bar) maximum working fluid and air pressure**.
- All fluid lines and components located downstream from the regulator must have a maximum working pressure of 100 psi (0.7 MPa, 7 bar) or greater.
- Do not exceed the regulator's 120°F (49°C) maximum temperature rating.
- Wear hearing protection when operating this equipment.
- Use fluids or solvents that are compatible with equipment wetted parts. See the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Comply with all applicable local, state and national fire, electrical and other safety regulations.

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K.H.	FIRE AND EXPLOSION HAZARD					
	Improper grounding can cause a hazardous condition and result in fire or explosion and serious injury.					
	• Use the regulator only in grounded fluid systems. See <b>Grounding</b> , page 4.					
N. K	• In an electrostatic system, the fluid entering the regulator and the fluid downstream of the regulator must be grounded.					
	• All conductive parts of the fluid and air system must be connected to a true earth ground.					
	<ul> <li>Any components connected to the regulator must be grounded separately, as the regulator is electrically non-conductive.</li> </ul>					
	PRESSURIZED EQUIPMENT HAZARD					
	Spray from the gun, hose leaks or ruptured components can splash fluid in the eyes or on the skin a cause serious injury.					
	<ul> <li>Do not stop or deflect fluid leaks with your hand, body, glove or rag.</li> </ul>					
	• Follow the <b>Pressure Relief Procedure</b> on page 10 before cleaning, checking, or servicing the regulator.					
	Tighten all fluid connections before operating the equipment.					
	• Check the hoses, tubes and couplings daily. Replace worn, damaged or loose parts immediately.					
	<ul> <li>Handle and route hoses and tubes carefully. Keep the hoses and tubes away from moving parts and hot surfaces.</li> </ul>					

### Grounding

For grounding instructions for the fluid regulator you are installing, see Fig. 1 or 2.

# A WARNING



#### FIRE AND EXPLOSION HAZARD

Improper grounding can cause a hazardous condition and result in fire or explosion and serious injury.

- Use the regulator only in grounded fluid systems.
- In an electrostatic system, the fluid entering the regulator and the fluid downstream of the regulator must be grounded.
- All conductive parts of the fluid and air system must be connected to a true earth ground.
- Any components connected to the regulator must be grounded separately, as the regulator is electrically non-conductive.

#### Installing the System



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To avoid having contaminants clog or damage the fluid regulator, flush the fluid line thoroughly before installing the regulator.

 Install an air regulator (H), check valve (G), and ball valve (D) on the air supply line, upstream from the fluid regulator (B). See Fig. 1 or 2, depending on which fluid regulator you are installing.

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**FIRE AND EXPLOSION HAZARD** Hazardous fluids in the pneumatic system could cause fire or explosion. Install a check valve or equivalent downstream of the air regulator, as shown in Fig. 1 or 2.

- 2. Install a ball valve (D) on the fluid supply line, upstream from the fluid regulator.
- 3. Install the fluid regulator as instructed in the next section, **Installing the Fluid Regulator**.

Accessories are available from your Graco distributor. If you supply your own accessories, be sure they are adequately sized and pressure rated for your system.

For assistance in designing a system that is customized for your application, contact your Graco distributor.



#### Fig. 2 \_\_\_\_\_ System Installation and Grounding, Part No. 236854 Fluid Regulator

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### Installing the Fluid Regulator

#### Part No. 235287 Fluid Regulator

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To avoid damaging plastic parts, do not over tighten fittings. Tighten them finger-tight, then re-tighten with a wrench 1/4 to 1/2 turn.

- 1. Provide a mounting bracket for the fluid regulator. Recommended dimensions are shown in Fig. 3.
- Slide the fluid regulator into the bracket (K) slot and secure it with the two setscrews (J) provided. See Fig. 4.
- Adjust the length of a 1/4 inch O.D. fluid tube (L) to connect between the regulator's fluid-out elbow (M) and the gun fluid inlet (N).
- 4. Slide the ferrules and nut from the fluid-out elbow (M) over the fluid tube (L).
- Connect the other end of the fluid tube (L) to the spray gun fluid inlet (N), using appropriate fittings (U). Install the fluid tube into the fluid-out elbow (M) and tighten the nut.
- 6. Install the 3/8 inch O.D. fluid tube (P) into the regulator's fluid-in elbow (R) and tighten the nut.
- 7. Install the 1/4 inch O.D. air tube (S) into the regulator's air-in elbow (T) and tighten the nut.



Fig. 3



1 Read the warning on page 4 and the instructions in Fig. 1.



Part No. 224531 Fluid Regulator and the PRO 4600 Standard Gun Bracket

## **A** CAUTION

To avoid damaging plastic parts, do not over tighten fittings. Tighten them finger-tight, then re-tighten with a wrench 1/4 to 1/2 turn.

- 1. Slide the fluid regulator into the PRO 4600 standard gun bracket (K) slot. See Fig. 4.
- Adjust the length of the 1/4 inch O.D. fluid tube (L) to connect between the regulator's fluid-out elbow (M) and the 1/4 npsm gun manifold fluid inlet fitting (N).

- 3. Tighten the fluid tube's 1/4 npsm swivel (U) onto the manifold fitting (N).
- Install the nut and ferrules from the fluid-out elbow (M) onto the fluid tube (L). Install the fluid tube into the elbow and tighten the nut.
- 5. Secure the regulator to the mounting bracket (K) with the two set screws (J) provided.
- 6. Install the 3/8 inch O.D. fluid tube (P) into the regulator's fluid-in elbow (R) and tighten the nut.
- 7. Install the 1/4 inch O.D. air tube (S) into the regulator's air-in elbow (T) and tighten the nut.

Part No. 224531 Fluid Regulator and the PRO 4600 Adjustable Gun Bracket

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To avoid damaging plastic parts, do not over tighten fittings. Tighten them finger-tight, then re-tighten with a wrench 1/4 to 1/2 turn.

**NOTE:** Bushing (AA), seal (BB), fluid-out elbow (CC), and fluid tube assembly (W) must be disassembled when installing the fluid regulator into the bracket (V). See Fig. 5.

- Install the fluid regulator through the gun mounting bracket (V). Make sure the two counterbores (Y) are facing the set screw holes in the mounting bracket. See Fig. 5.
- 2. Install the bushing (AA), seal (BB), and fluid-out elbow (CC) into the regulator. Tighten and adjust the elbow to point towards the gun manifold.
- Adjust the length of the 1/4 inch O.D. fluid tube assembly (W) to connect between the regulator's fluid-out elbow (CC) and the 1/4 npsm gun manifold fluid fitting (X). See Fig. 6.
- 4. Tighten the fluid tube's 1/4 npsm swivel (Z) onto the manifold fitting (X).
- Install the nut and ferrules from the regulator's fluid-out (CC) elbow onto the fluid tube assembly (W). Install the fluid tube into the elbow and tighten the nut.
- Secure the fluid regulator to the mounting bracket (V), using the two set screws (DD) provided.
- 7. Install the 3/8 inch O.D. fluid tube (EE) into the regulator's fluid-in elbow (FF) and tighten the nut.
- 8. Install the 1/4 inch O.D. air tube (GG) into the regulator's air-in elbow (HH) and tighten the nut.





Part No. 236854 Fluid Regulator and the PRO Auto Xs or PRO 5500 Spray Gun

## **A** CAUTION

To avoid damaging plastic parts, do not over tighten fittings. Tighten them finger-tight, then re-tighten with a wrench 1/4 to 1/2 turn.

- 1. Position the fluid regulator's air-in elbow (JJ) and fluid-in elbow (KK) as shown in Fig. 7 for proper hose routing.
- Connect the regulator's fluid outlet swivel fitting (LL) to the PRO Auto Xs or PRO 5500 gun's fluid inlet (P1). Position the regulator and tighten the swivel fitting.
- 3. Install the 3/8 inch O.D. fluid tube (MM) into the regulator's fluid-in elbow (KK) and tighten the nut.
- 4. Install the 1/4 inch O.D. air tube (NN) into the regulator's air-in elbow (JJ) and tighten the nut.



Read the warning on page 4 and the instructions in Fig. 2, page 5.



# Operation

#### Operation

**NOTE:** Do not use the fluid regulator to shut-off the fluid. The fluid regulator is not a fluid shut-off device and will not be consistent in completely shutting-off the fluid flow.

- 1. Start the fluid supply source.
- 2. Open the ball valve at the fluid regulator's fluid inlet.
- 3. Increase the air pressure to the fluid regulator until you have the desired fluid flow rate. Use the **Performance Charts**, page 11, as a guide.
- 4. Monitor the regulator's air line and air bleed hole daily for any sign of fluid. Stop operation immediately if fluid is present. Refer to troubleshooting, page 12, to correct the problem. See Fig. 8, page 13, for the air bleed hole location.

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#### EXPLOSION HAZARD



Fluid leakage into the regulator air line or from the air bleed hole can result in equipment damage and the risk of

explosion. If fluid is in the air line or coming out of the air bleed hole, stop operation and correct the problem immediately.

### Flushing

Flush the regulator with a compatible solvent whenever the rest of the system is flushed. Flush until the equipment is thoroughly clean. Use the lowest possible pressure when flushing.

### Pressure Relief Procedure

## WARNING



PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of serious injury, including splashing fluid in the eyes or

on the skin, follow this procedure when this manual instructs you to relieve pressure and before cleaning, checking or servicing the fluid regulator.

- 1. Shut off the fluid supply source.
- 2. Close the fluid regulator's fluid inlet ball valve.
- 3. Make sure there is at least 10 psi (.07 MPa, 0.7 bar) air pressure to the regulator's air inlet.
- 4. Relieve fluid pressure in the regulator by triggering the spray gun until fluid stops flowing.
- 5. Disconnect the fluid line from the regulator's fluid inlet.
- 6. Shut off the air to the regulator and relieve the pressure in the regulator's air inlet line.

## **Performance Charts**

#### **Fluid Flow Versus Pilot Pressure**

NOTE: Chart results obtained using Part No. 224531 fluid regulator with PRO 4600 spray gun.



# Troubleshooting

## A WARNING

#### PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of serious injury, including splashing fluid in the eyes or on the skin, follow the **Pressure Relief** 

**Procedure** on page 10 when this manual instructs you to relieve pressure and before cleaning, checking or servicing the fluid regulator.

**NOTE:** Check all remedies in the chart below before disassembling the fluid regulator.

PROBLEM		CAUSE		SOLUTION		
Fluid leaks from the retaining	1.	Diaphragm (4) damaged	1.	Replace diaphragm		
ring (2) or air bleed hole in the retaining cap (3)	2.	Housing (1) damaged	2.	Check for damage on sealing ridge; replace housing if damaged		
	3.	Retaining ring (2) loose	3.	Tighten retaining ring		
No pressure regulation		Diaphragm (4) damaged	1.	Replace diaphragm		
	2.	Damaged or clogged regulator	2.	Clear obstruction; service regulator if necessary		
	3.	Faulty air supply	3.	Check air supply for proper pressure at regulator		
Fluid outlet pressure creeps up above setting OR	1.	Damaged or clogged regulator	1.	Clear obstruction; service regulator if necessary		
surge of paint when gun is trig- gered	2.	Diaphragm (4) damaged	2.	Replace diaphragm		
	3.	Seat (7) leaking	3.	Replace seat (7), poppet (8) and o-ring (9)		
	4.	Seat (7) loose	4.	Tighten seat		
Fluid is in the air line	1.	Diaphragm (4) damaged	1.	Replace diaphragm		
	2.	Retaining ring (2) loose	2.	Tighten retaining ring		

## Service

## WARNING



PRESSURIZED EQUIPMENT HAZARD

To reduce the risk of serious injury, including splashing fluid in the eyes or on the skin, follow the Pressure Relief **Procedure** on page 10 when this manual instructs you to relieve pressure and before cleaning, check-

ing or servicing the fluid regulator.

- Relieve the pressure. 1.
- 2. Disconnect the air tube from the air-in elbow (12). See Fig. 8.
- 3. Loosen the retaining ring (2) and remove the cap (3), o-ring (5), diaphragm (4) and actuator (6).
- 4. Loosen the seat (7), using the seat tool (16) provided. Remove the poppet (8), o-ring (9), and spring (10).

5. Inspect and clean all parts. To clean the diaphragm (4), dampen a rag with solvent and wipe the diaphragm's PTFE (white) side only.

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Do not immerse or soak the diaphragm in solvent. Do not expose the buna (black) side of the diaphragm (4) to solvents as they may damage the buna material.

- Replace parts that are worn or damaged. Remove 6. and replace the diaphragm, o-rings, and seat at least once a year.
- 7. Install the spring (10), o-ring (9), poppet (8), and seat (7) into the regulator. Tighten the seat with the wrench (16).
- 8. Install the actuator (6), diaphragm (4--with the PTFE side toward the fluid), o-ring (5), cap (3) and retaining ring (2). Tighten the retaining ring securely to prevent fluid leakage.



**Parts** 



#### Part No. 235287 Standard Fluid Pressure Regulator Includes items 1–16 Part No. 236854 PRO Auto Xs and PRO 5500 Fluid Pressure Regulator Includes items 1–14, 16–17 Part No. 224531 PRO 4600 Fluid Pressure Regulator Includes items 101 and 102

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	185814	HOUSING, regulator;		11	111371	CONNECTOR, elbow;	
		235287 Regulator Only	1			for 3/8 in. O.D. tube	1
	190234	HOUSING, regulator;		12	111370	CONNECTOR, elbow;	
		236854 Regulator Only	1			for 1/4 in. O.D. tube	2
2	187175	RING, retaining	1	13	187206	SEAL, fitting; nylon	2
3	187174	CAP, retaining	1	14	187205	BUSHING; 1/8 npt	1
4	187168	DIAPHRAGM; PTFE with		15	111260	SET SCREW; 235287 Regulator Only	y 2
		nylon/buna-N layer	1	16	187337	WRENCH, regulator	1
5⁄~	110497	O-RING; Viton®	1	17	208434	ADAPTER, union; 1/4-18 npsm;	
6	187173	ACTUATOR, valve	1			236854 Regulator Only	1
71	187171	SEAT, valve	1	101	235287	FLUID REGULATOR, standard;	
8/	185861	POPPET	1			Includes items 1 to 16 above	1
9/	111345	O-RING; PTFE	1	102	235121	FLUID TUBE ASSEMBLY;	
10	110498	SPRING, compression	1			with brass fitting; not shown	1

✓ Keep these spare parts on hand to reduce down time.

## **Technical Data**

Category	Data			
Maximum Fluid Inlet Pressure	100 psi (0.7 MPa, 7 bar)			
Maximum Air Inlet Pressure	100 psi (0.7 MPa, 7 bar)			
Maximum Fluid Outlet Pressure	100 psi (0.7 MPa, 7 bar)			
Maximum Operating Temperature	120° F (49° C)			
Weight	5.6 oz. (160 g)			
Wetted Parts	Part No. 235287 and 236854: Stainless Steel, Nylon, Acetal or Delrin®, PTFE			
	<i>Part No. 224531:</i> Stainless Steel, Nylon, Acetal or Delrin <sup>®</sup> , PTFE, Brass (tube swivel fitting)			

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## **Graco Standard Warranty**

Graco warrants all equipment manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor 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.

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