Instructions - Parts

Low Shear Back Pressure Regulator

3A7527D

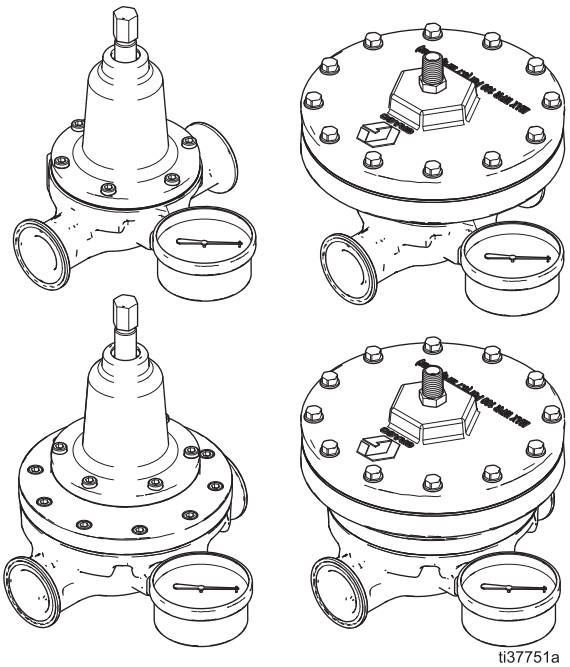
EN

The back pressure regulator (BPR) controls fluid pressure and flow in circulation systems. For professional use only.

See page 2 for model information, including maximum working pressure and approvals.

Important Safety Instructions

Read all warnings and instructions in this manual before using the equipment. Save these instructions.



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Contents

Related Manuals

Manual in English	Description
3A4030	Intelligent Paint Kitchen
3A7709	Pneumatic Pump Control Module

Models and Approvals

Part	Description	Flow Range	Regulated Fluid Pressure	Max. Fluid Working Pressure psi (MPa, bar)	Max. Air Working Pressure psi (MPa, bar)	Approvals
25R487	Air Operated Type (Lower flow)	0-10 gpm, 0-38 lpm	25-250 psi (.17-1.72 MPa, 1.7-17.2 bar)	300 psi (2.1 MPa, 21 bar)	100 psi (0.7 MPa, 7.0 bar)	CE Ex II 2 G Ex h IIB T6 Gb 0°C to 50°C **NOTE**: Type of Protection “h” applied is constructional safety “c.”
25R488	Mechanical (spring) Type (Lower flow)	0-10 gpm, 0-38 lpm				
25R457	Air Operated Type (Higher flow)	5-25 gpm, 19-95 lpm				
25R647	Mechanical (spring) Type (Higher flow)	5-25 gpm, 19-95 lpm				

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 or on warning labels, 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




FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in **work area** can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. 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 sparking).
- Ground all equipment in the work area. See **Grounding** instructions.
- 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.
- **Stop operation immediately** if static sparking occurs or you feel a shock**.** Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.


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 Specifications** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Specifications** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheets (SDSs) from distributor or retailer.
- 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. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- 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.

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD

Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.

- Follow the **Pressure Relief Procedure** when you stop spraying/dispensing and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.

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 Safety Data Sheets (SDSs) 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.

PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. Protective 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.

Installation

NOTICE

If an isolation valve is installed downstream of the BRP in the circulation line, the maximum circulation pump pressure is not to exceed 600 psig (4.1 MPa, 41 bar). Pressure greater than 600 psi might damage the BPR.

NOTICE

Handle the back pressure regulator with care to avoid damaging the diaphragm.

Install the back pressure regulator (BPR) (A) in the circulation system fluid return line (B). (See FIG. 1.) If more than one spray station is used, install the BPR in the fluid supply line after the last station. This helps maintain proper circulating pressures in the system.

1. Connect the fluid return line to the inlet and outlet. Make sure the flow direction matches the fluid flow arrow markings on the regulator body.
2. Install the fluid pressure gauge (17) in one of the fluid pressure gauge ports on the fluid housing. For an air operated type BPR, see page 9. For a mechanical (spring) operated type BPR, see page 11. Use thread sealant.

NOTICE

When installing the gauge, use very little thread sealant on the male threads to avoid plugging the gauge.

3. Install the plug (16) in the other port on the fluid housing. Use thread sealant.
4. Air operated type BPR: Connect supply line (C) to the air inlet of the BPR. The port on top of the air section is 1/8 NPT. Convert port to 1/4 NPT male with supplied fitting, if desired.

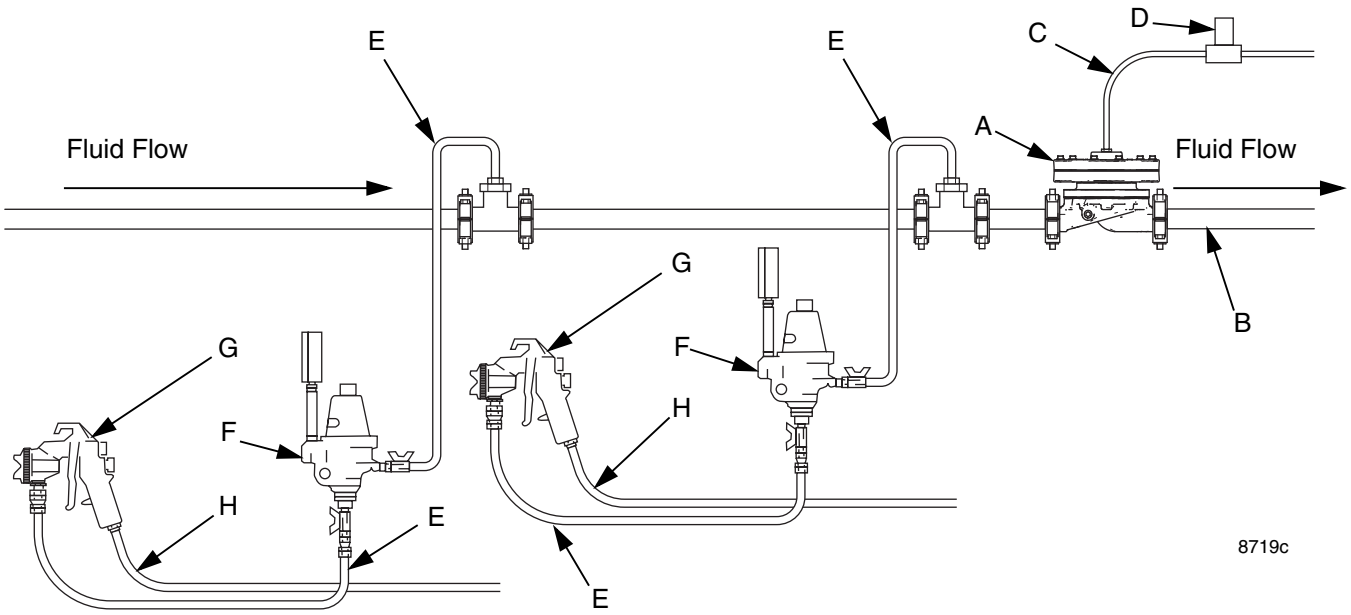


FIG. 1. Typical Installation

Key:

A Air Operated Type Back Pressure Regulator
B Fluid Return Line
C Back Pressure Regulator Air Supply Line (not required for mechanical (spring) type BPR)
D Air Regulator or BPR Controller
E Fluid Supply Line
F Fluid Pressure Regulator
G Air Spray Gun
H Gun Air Supply Line

Grounding

The equipment must be grounded to reduce the risk of static sparking. Static sparking can cause fumes to ignite or explode. Install the BPR into piping that is properly grounded. Grounding provides an escape wire for the electric current.

Operation

NOTE: The BPR controls fluid pressure ahead of its inlet.

Air Operated Type

Adjust the air pressure regulator (D) to the desired fluid back pressure using the ratios below:

- For lower flow units (25R487):

  The fluid:air ratio is approximately 3:1; 83 psi (0.6 MPa, 5.7 bar) inlet air pressure = 250 psi (0.6 MPa, 17.2 bar) inlet fluid pressure.

- For higher flow units (25R457):

  The fluid:air ratio is approximately 2.5:1; 100 psi (0.7 MPa, 7.0 bar) inlet air pressure = 250 psi (0.6 MPa, 17.2 bar) inlet fluid pressure.

Do not exceed the maximum air pressure of 100 psi (0.7 MPa, 7.0 bar).

Mechanical (spring) Type

Turn the adjusting screw clockwise to increase pressure and counterclockwise to decrease pressure.

Flushing (if required)

Flush the back pressure regulator with a compatible solvent whenever the rest of the system is being flushed. Fully open the back pressure regulator when flushing.

Service and Repair

Pressure Relief Procedure

Follow the Pressure Relief Procedure whenever you see this symbol.

This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing fluid and moving parts, follow the Pressure Relief Procedure when you stop spraying and before cleaning, checking, or servicing the equipment.

1. Shut off the circulation system pump.
2. Adjust the BPR to full open, and open drain valves in the circulation system to fully relieve circulation system pressure.

   For the pneumatic section of the BPR, relieve the air pressure by reducing the regulated air pressure to zero and disconnecting the air supply line from the BPR.

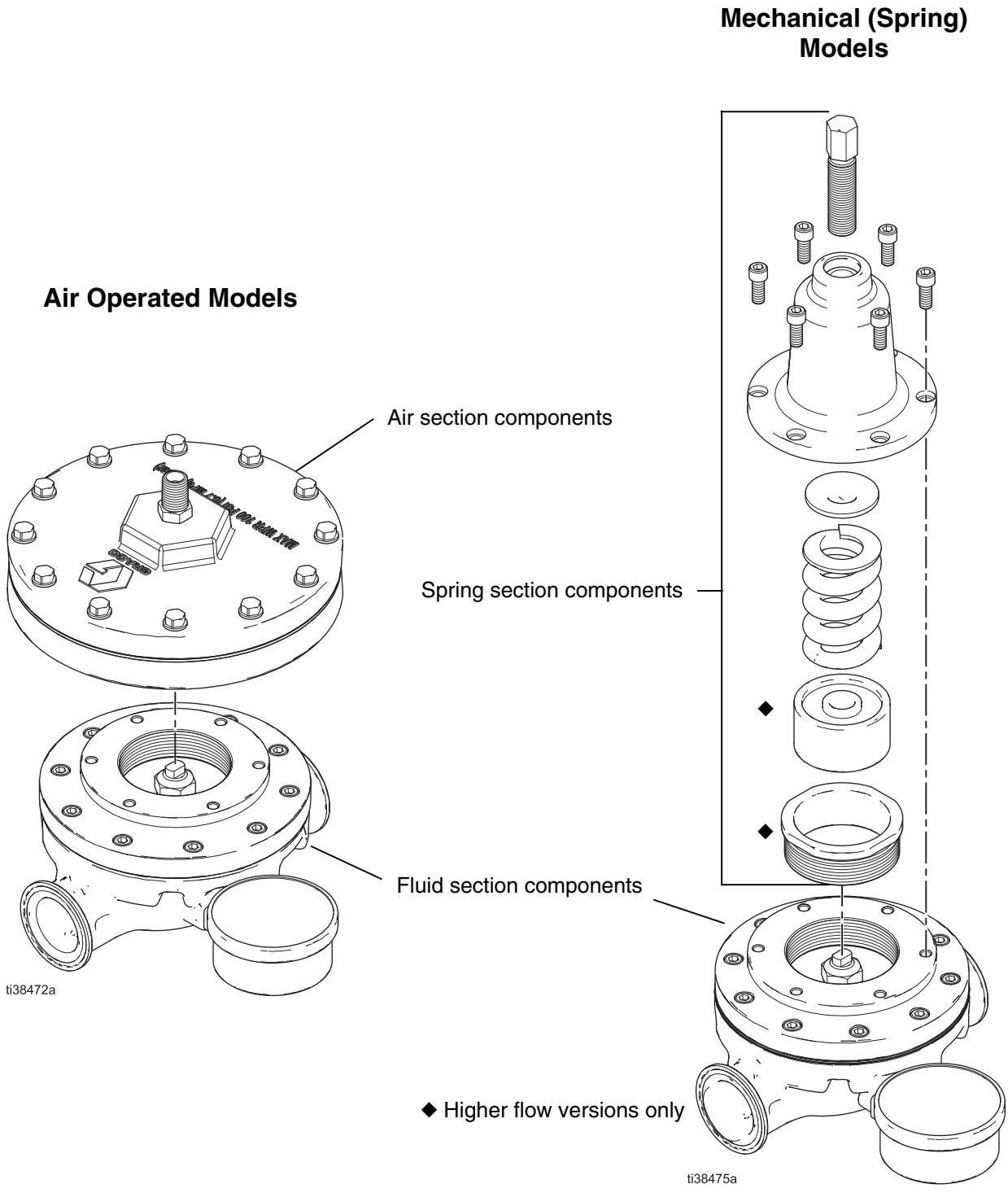


FIG. 2. Sections of the Back Pressure Regulator

Service and Repair Procedures for the BPR

NOTE: Regular cleaning and inspection of the BPR, based on the degree and kind of service, is essential.

1. Shut off the pump.
2. On spring models, open the BPR by turning the adjustment screw (43) *counterclockwise* until no spring pressure is felt. See FIG. 4.
3. Follow the **Pressure Relief Procedure** on page 6 to relieve all air and fluid pressures in the system.

NOTE: The BPR can either be serviced on line or removed from the circulation line for service.

4. Clean the BPR with a compatible solvent when servicing and repairing the BPR.
5. To repair the BPR see the following instructions, according to your equipment (see FIG. 2):
   - For the air section components of the BPR, see **Air Section Components Service and Repair**.
   - For the spring section components, see **Mechanical (Spring) Components Service and Repair**.
   - For the fluid section components see **Fluid Section Components Service and Repair**.

Air Section Components Service and Repair

See FIG. 3. The air section housing (15) can be removed by unscrewing it from the BPR and repaired offline, if desired.

Inspect the piston rod (15b), the diaphragm (15e), and the support washer plate (15c) for damage. Replace parts as needed.

Mechanical (Spring) Components Service and Repair

See FIG. 4. Inspect the cap (42), spring guide (41), spring (40), spring spacer (44), and spring bearing (45) for damage. Replace parts as needed.

Fluid Section Components Service and Repair

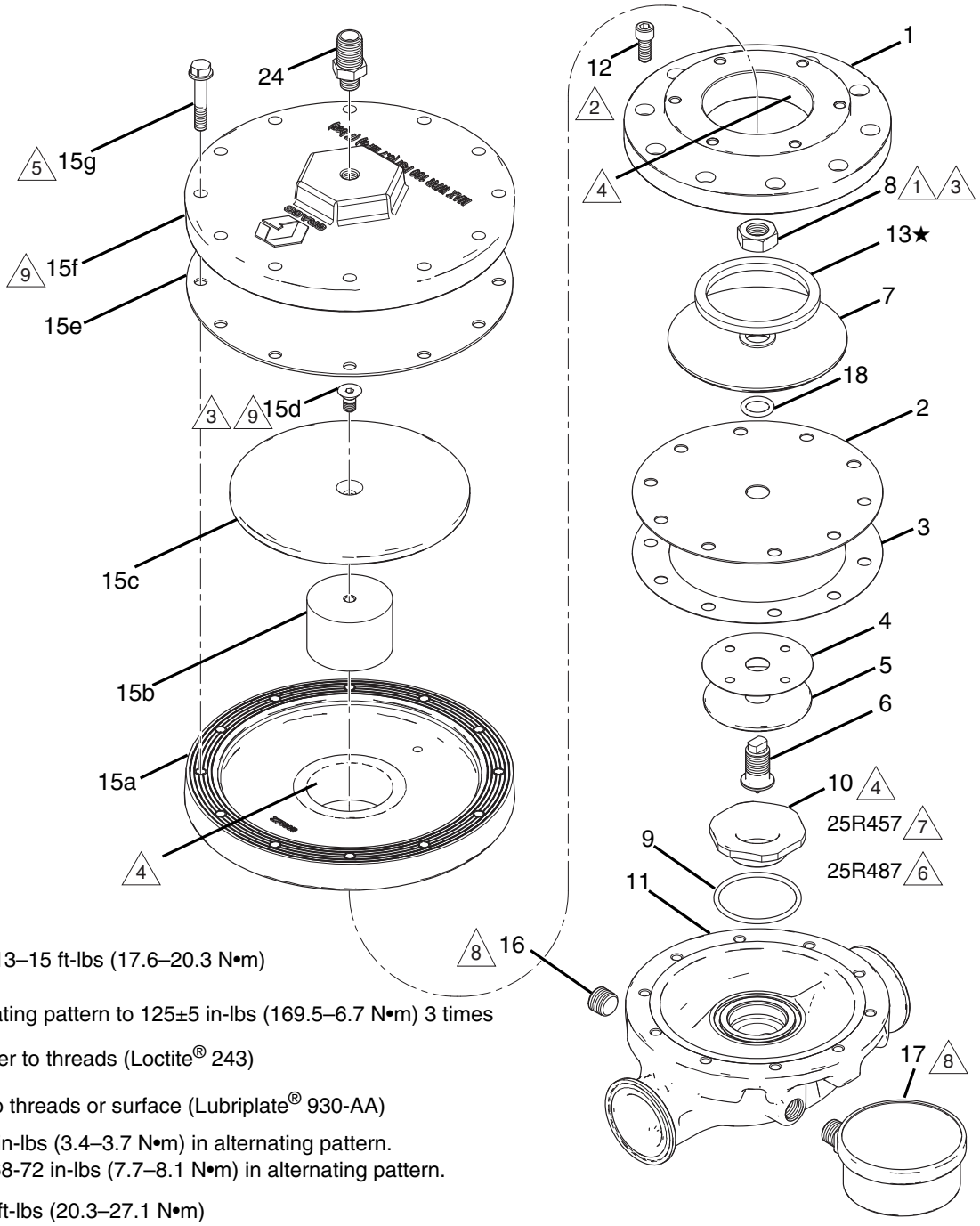
See FIG. 3. Inspect plate (7), gasket (13) on 25R487 only, diaphragm (2), diaphragm gasket (3), gasket (4), retainer (5), stud (6), and seat (10). Replace parts as needed.

NOTES:

- Replace o-ring (18) during every inspection.
- Replace o-ring (9) when removing the seat (10).

Parts

25R457 Higher Flow Air Operated BPR
25R487 Lower Flow Air Operated BPR



1 Torque twice to 13–15 ft-lbs (17.6–20.3 N•m)

2 Torque in alternating pattern to 125±5 in-lbs (169.5–6.7 N•m) 3 times

3 Apply threadlocker to threads (Loctite® 243)

4 Apply lubricant to threads or surface (Lubriplate® 930-AA)

5 Torque to 30-33 in-lbs (3.4–3.7 N•m) in alternating pattern.
Then, torque to 68-72 in-lbs (7.7–8.1 N•m) in alternating pattern.

6 Torque to 15–20 ft-lbs (20.3–27.1 N•m)

7 Torque to 35–45 ft-lbs (47.5–61 N•m)

8 Apply liquid thread sealant

9 Torque assembly (15) to 95–105 ft-lbs (128.8–142.3 N•m)

★ For 25R487 only

FIG. 3. Parts of an Air Operated BPR

25R457 Higher Flow Air Operated
25R487 Lower Flow Air Operated

Ref.	Part	Description	Qty.
1	19Y643	(25R457) ADAPTER	1
	19Y623	(25R487) ADAPTER†	1
2††	19Y646	(25R457) DIAPHRAGM	1
	172193	(25R487) DIAPHRAGM	1
3††	19Y647	(25R457) GASKET*	1
	171912	(25R487) GASKET†	1
4††	171913	GASKET	1
5††	19Y630	RETAINER, DIAPHRAGM, PLATE, 2-PIECE	1
6††	19Y626	RETAINER, DIAPHRAGM, STUD, 2-PIECE	1
7††	19Y948	(25R457) PLATE, DIAPHRAGM, FLUID, STEEL, 3.4" diameter	1
	164864	(25R487) PLATE, DIAPHRAGM, 2.5" diameter	1
8††	100111	NUT	1
9	166612	(25R457) PACKING, O-RING	1
	111603	(25R487) PACKING, O-RING	1
10	19Y652	(25R457) SEAT	1
	19Y624	(25R487) SEAT	1
11	19Y651	(25R457) BODY, FLUID	1
	19Y622	(25R487) BODY, FLUID	1
12††	101682	SCREW, CAP, SCH*† 25R457: Qty 10 25R487: Qty 6	10/6
13††	19C254	(25R457) GASKET	1
	19C044	(25R487) GASKET	1
15	25R448	(25R457) HOUSING, AIR SECTION*	1
	25R489	(25R487) HOUSING, AIR SECTION†	1
15a	19Y628	HOUSING, DIAPHRAGM*†	1
15b	19Y627	ROD, PISTON*†	1
15c	192194	(25R457) PLATE, SUPPORT WASHER, 5.3" diameter*	1
	15J461	(25R487) WASHER, SUPPORT, 3.0" diameter*†	1
15d	C20811	SCREW, SOCKETHEAD, FLAT*†	1
15e	180979	DIAPHRAGM*†	1
15f	180981	COVER, DIAPHRAGM*†	1
15g	114104	SCREW, MACHINE, HEX WASH HEAD*†	12
16	101970	PLUG, PIPE	1
17	187876	GAUGE, PRESSURE, FLUID	1
18††	157277	PACKING, O-RING	1
24	151519	FITTING, NIPPLE, REDUCING (optional)	1

Purchase conversion kits separately:

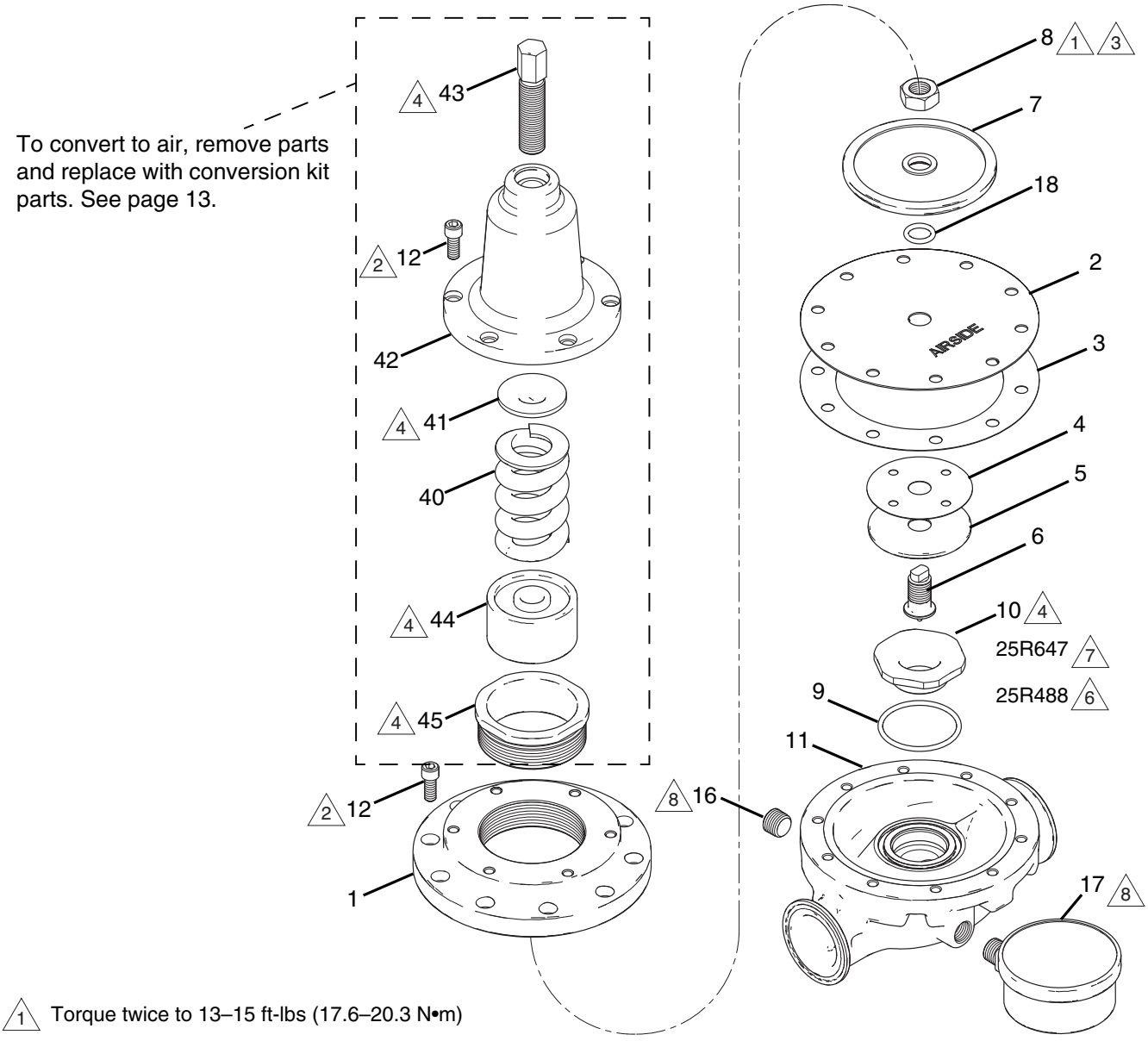
* *Parts included in Conversion Kit 25T509.*

† *Parts included in Conversion Kit 25T508.*

*See **Conversion Kits** on page 13.*

†† *Included in Diaphragm Kits 25R842 and 25T507.*

25R647 Higher Flow Mechanical (Spring)
25R488 Lower Flow Mechanical (Spring)



1 Torque twice to 13–15 ft-lbs (17.6–20.3 N•m)

2 Torque in alternating pattern to 125±5 in-lbs (169.5–6.7 N•m) 3 times

3 Apply threadlocker to threads (Loctite® 243)

4 Apply lubricant to threads or surface (Lubriplate® 930-AA)

5 Torque to 30-33 in-lbs (3.4–3.7 N•m) in alternating pattern.
Then, torque to 68-72 in-lbs (7.7–8.1 N•m) in alternating pattern.

6 Torque to 15–20 ft-lbs (20.3–27.1 N•m)

7 Torque to 35–45 ft-lbs (47.5–61 N•m)

8 Apply liquid thread sealant

FIG. 4. Parts of a Mechanical (Spring) Operated BPR

25R647 Higher Flow Mechanical (Spring)
25R488 Lower Flow Mechanical (Spring)

Ref.	Part	Description	Qty.
1	19Y643	(25R647 only) ADAPTER	1
2	19Y646	(25R647) DIAPHRAGM	1
	172193	(25R488) DIAPHRAGM	1
3	19Y647	(25R647) GASKET, DIAPHRAGM	1
	171912	(25R488) GASKET, DIAPHRAGM	1
4	171913	GASKET	1
5	19Y630	RETAINER, DIAPHRAGM, PLATE, 2-PIECE	1
6	19Y626	RETAINER, DIAPHRAGM, STUD, 2-PIECE	1
7	19Y948	PLATE, DIAPHRAGM, FLUID, STEEL, 3.4" diameter	1
8	100111	NUT	1
9	166612	PACKING, O-RING	1
10	19Y652	(25R647) SEAT, FLUID	1
	19Y624	(25R488) SEAT, FLUID	1
11	19Y651	(25R647) BODY, FLUID	1
	19Y622	(25R488) BODY, FLUID	1
12	101682	SCREW, CAP, SCH	16
16	101970	PLUG, PIPE, HDLS	1
17	187876	GAUGE, PRESSURE, FLUID	1
18	157277	PACKING, O-RING	1
40	104144	SPRING,COMPRESSION	1
41	160033	GUIDE, SPRING	1
42	209027	CAP, RGLTR, FLUID	1
43	186872	SCREW, ADJUSTMENT	1
44	19B636	GUIDE, SPRING, SPACER	1
45	19B874	BEARING, SPRING, GUIDE	1

Conversion Kits

Kit 25T509 converts a 25R647 (Higher Flow Mechanical) spring-operated back pressure regulator to a pneumatic-operated regulator. Includes refs. 3, 12, 13, 15 (see page 9).

Kit 25T508 converts a 25R488 (Lower Flow Mechanical) spring-operated back pressure regulator to a pneumatic-operated regulator. Includes refs. 1, 3, 12, 13, 15 (see page 9).

Conversion Kit Installation

1. Follow the **Pressure Relief Procedure** on page 6 to relieve all fluid pressure in the system.
2. See FIG. 4. Remove the adjustment screw (43), cap screws (12), and regulator cap (42) from the existing mechanical BPR.
3. Remove the spring guide (41), spring (40), diaphragm (2), and seat (10) from the regulator housing.
4. See FIG. 3. Install adapter (1) (lower flow BPR only) and install the air section (15). Follow the lubrication and torque requirements on page 9.

Repair Kits

Repair Kits	Higher Flow (for 25R457 and 25R647)	Lower Flow (for 25R487 and 25R488)
Diaphragm kit includes refs. 2, 3, 4, 5, 6, 7, 8, 12, 13, 18 (see pages 9 and 11)	25R842	25T507

Accessories

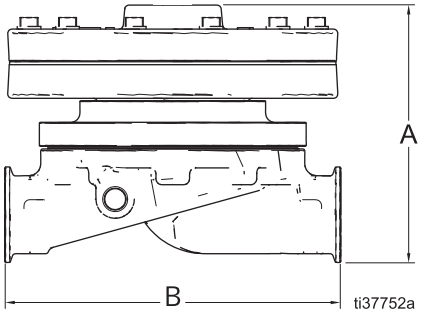
Fluid Connection Adapters	Size		Connection	Length	Quantity
19A834 Adapter	1.5 in. sanitary to	2 in. NPT	male	2.13 in. (54 mm)	1
17H273 Adapter		1.25 in. NPT	male	1.95 in. (50 mm)	
17G576 Adapter		1.5 in. NPT	male	2.21 in. (56 mm)	
17F440 Adapter		1 in. NPT	male	2.12 in. (54 mm)	
17K780 Adapter		1 in. NPT	female	2.25 in. (57 mm)	
19C093 Adapter		2 in. sanitary	----	1.50 in. (38 mm)	

Part	Size	Description	Quantity
118598 Clamp	1.5 in.	Single pin, heavy duty sanitary clamp	1
120351 Gasket		PTFE envelope with Viton™ insert	1

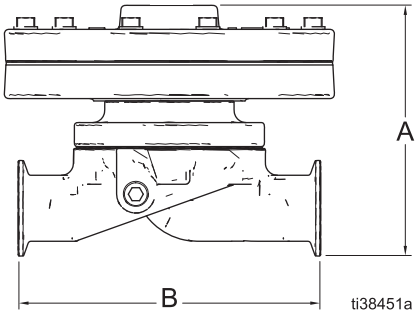
Dimensions

Air Operated Type

25R457

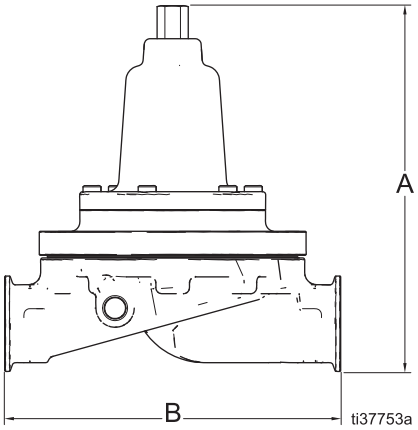


25R487

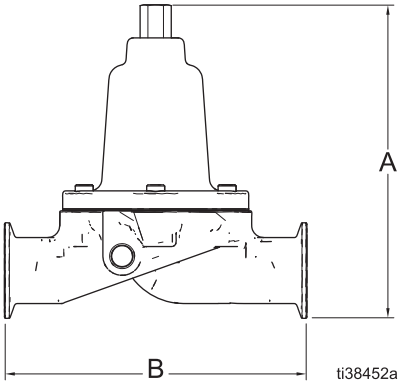


Mechanical, Spring Type

25R647



25R488



Part	Description	A	B
25R457	Higher Flow Air Operated Type	5.4 in. (137 mm)	6.5 in. (165 mm)
25R487	Lower Flow Air Operated Type	5.2 in. (132 mm)	6.3 in. (160 mm)
25R647	Higher Flow Mechanical (spring) Type	8.8 in. (224 mm)	6.5 (165 mm)
25R488	Lower Flow Mechanical (spring) Type	7.2 in. (183 mm)	6.3 in. (160 mm)

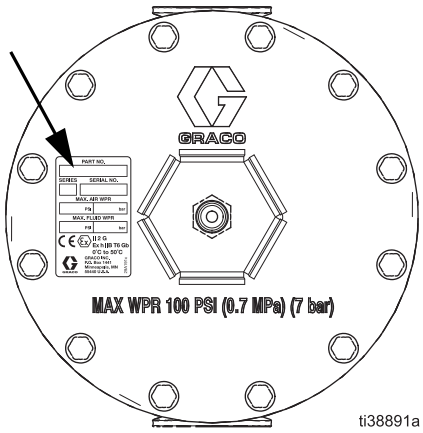


FIG. 5. Part Number on Air Section Housing (15)

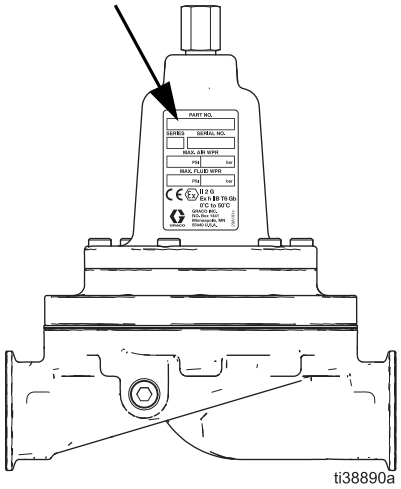


FIG. 6. Part Number on Regulator (42)

Note: The MAX WPR 100 PSI is for the air section.

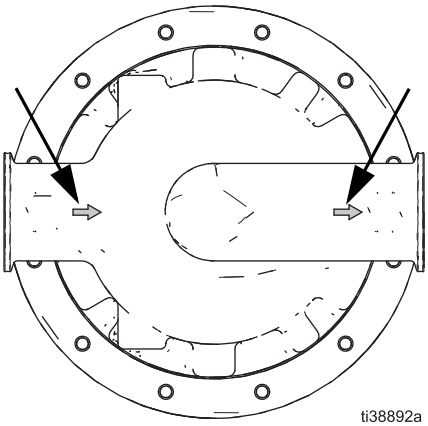


FIG. 7. Inlet and Outlet Flow on Regulator (42) Bottom

Technical Specifications

Back Pressure Regulator		
	US	Metric
Maximum fluid pressure	300 psi*	2.1 MPa, 21 bar
Maximum air pressure (Air Operated Type)	100 psi	0.7 MPa, 7 bar
Regulated pressure range	25-250 psi	.17-1.72 MPa, 1.7-17.2 bar
Maximum fluid temperature	122°F (50°C)	
Viscosity range	3 cP to 1000 cP	
Fluid Flow Range		
Lower Flow Models		
25R488 Mechanical (Spring) Type	0-10 gpm	0-38 lpm
25R487 Air Operated Type		
Higher Flow Models		
25R647 Mechanical (Spring) Type	5-25 gpm	19-95 lpm
25R457 Air Operated Type		
Inlet/Outlet Sizes		
Air inlet size	1/4 in. npt(m)	
Gauge port size	1/4 npt(f)	
Inlet (all models)	1.5 in. sanitary (quick clamp)	
Outlet size (all models)	1.5 in. sanitary (quick clamp)	
Weight		
25R488	6.2 lb	2.8 kg
25R487	9.5 lb	4.3 kg
25R647	9.6 lb	4.4 kg
25R457	13.2 lb	6.0 kg
Noise		
Sound pressure level at maximum flow rate	Less than 75 dB(A)	
Materials of Construction		
Wetted parts	Stainless steel, tungsten carbide coated stainless steel, cellulose fiber with nitrile rubber binder gasket	
Diaphragm	Nylon fabric base with impregnated buna-N, fluid side PTFE coated	

* If an isolation valve is installed downstream of the BRP in the circulation line, the maximum circulation pump pressure is not to exceed 600 psig (4.1 MPa, 41 bar). Pressure greater than 600 psi might damage the BPR.

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Lubriplate® is a registered trademark of Lubriplate Lubricants Company.
Viton™ is a trademark of The Chemours Company.

California Proposition 65

CALIFORNIA RESIDENTS

⚠ **WARNING:** Cancer and reproductive harm – www.P65warnings.ca.gov.

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.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

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.

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

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Revision D, February 2021