

Instructions—Parts List



STAINLESS STEEL,
WATERBASE-COMPATIBLE, HIGH PRESSURE

Fluid Pressure Regulators

308647S

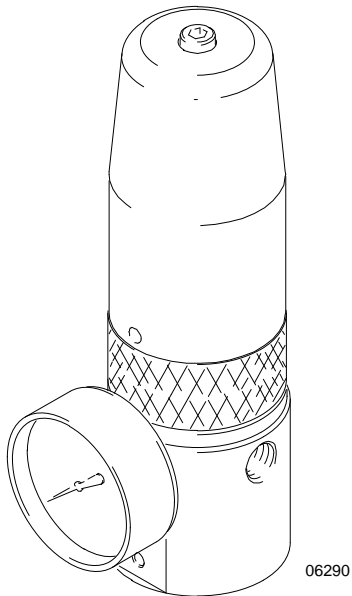
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For precise downstream pressure and flow control.

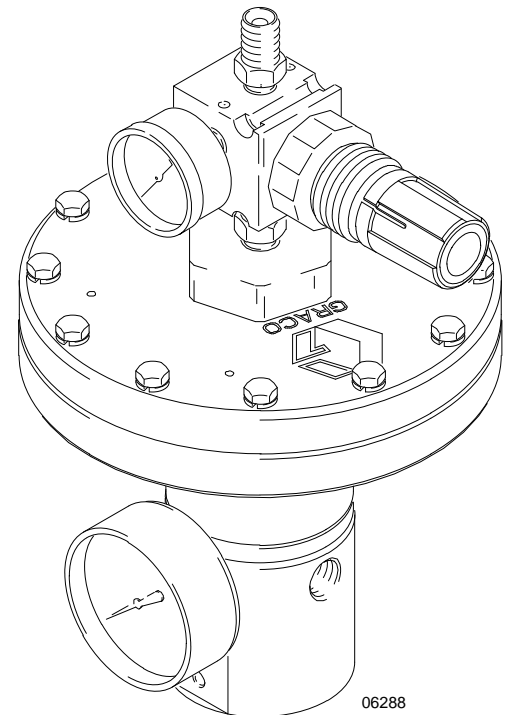


Important Safety Instructions

Read all warnings and instructions in this manual.
Save these instructions.
See page 2 for List of Models and Table of Contents.



**Model 238890,
238892**
(spring-operated)
Model 26A086
(acid compatible)



Model 238894
(air-operated)

U.S. Patent No. 4942899

06540A

PROVEN QUALITY. LEADING TECHNOLOGY.

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List of Models

Spring-Operated Models

Part No.	Description	Range	Maximum Fluid Inlet Pressure	Regulated Fluid Outlet Pressure
238889	with EZ Flush gauge port plug	Medium	6000 psi (41 MPa, 414 bar)	500–3000 psi (3.4–21 MPa, 34–207 bar)
238890	with fluid pressure gauge	Medium	6000 psi (41 MPa, 414 bar)	500–3000 psi (3.4–21 MPa, 34–207 bar)
238891	with EZ Flush gauge port plug	High	6000 psi (41 MPa, 414 bar)	3000–5000 psi (21–34 MPa, 207–345 bar)
238892	with fluid pressure gauge	High	6000 psi (41 MPa, 414 bar)	3000–5000 psi (21–34 MPa, 207–345 bar)
26A086	with gauge port	Medium	6000 psi (41 MPa, 414 bar)	500 – 3000 psi (3.4–21 MPa, 34–207 bar)

Air-Operated Models

Part No.	Description	Range	Maximum Inbound Air Pressure	Maximum Fluid Inlet Pressure	Regulated Fluid Outlet Pressure
238893	with EZ Flush gauge port plug	Full	100 psi (0.7 MPa, 7 bar)	6000 psi (41 MPa, 414 bar)	500–4000 psi (3.4–28 MPa, 34–276 bar)
238894	with fluid pressure gauge	Full	100 psi (0.7 MPa, 7 bar)	6000 psi (41 MPa, 414 bar)	500–4000 psi (3.4–28 MPa, 34–276 bar)
244734	with EZ Flush gauge port plug	Full	100 psi (0.7 MPa, 7 bar)	6000 psi (41 MPa, 414 bar)	500–4000 psi (3.4–28 MPa, 34–276 bar)
248090	with fluid pressure gauge (LASD)	Full	100 psi (0.7 MPa, 7 bar)	6000 psi (41 MPa, 414 bar)	500–4000 psi (3.4–28 MPa, 34–276 bar)
255072	high resolution with fluid pressure gauge	Full	100 psi (0.7 MPa, 7 bar)	6000 psi (41 MPa, 414 bar)	500–2700 psi (3.4–19 MPa, 34–190 bar)

Symbols

Warning Symbol



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

Caution Symbol



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

WARNING



INSTRUCTIONS

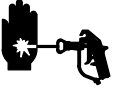
EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction 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 not sure, 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.
- Do not kink or over bend the hose or use the hose to pull equipment.
- Do not exceed the maximum working pressure of the lowest rated component in your system. Do not exceed **6000 psi (41 MPa, 414 bar) maximum fluid inlet pressure of the regulator or the maximum working pressure of the lowest-rated component in your system.**
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Always wear protective eyewear, gloves, clothing, and respirator as recommended by the fluid and solvent manufacturer.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

WARNING

SKIN INJECTION HAZARD



Spray from the gun, leaks, or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Fluid splashed in the eyes or on the skin can also cause serious injury.



- Fluid injected into the skin might look like just a cut, but it is a serious injury. **Get immediate surgical treatment.**
- Do not point the gun at anyone or at any part of the body.
- Do not put your hand or fingers over the spray gun tip or extruder gun tip.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Always have the tip guard and the trigger guard on the gun when spraying.
- Check the gun diffuser operation weekly. Refer to the gun manual.
- Be sure the gun trigger safety operates before spraying.
- Lock the gun trigger safety when you stop dispensing.
- Follow the **Pressure Relief Procedure** on page 8 if the spray tip clogs and before cleaning, checking, or servicing the equipment.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn or damaged parts immediately. Do not repair high pressure couplings; you must replace the entire hose.
- Fluid hoses must have spring guards on both ends to help protect them from rupture caused by kinks or bends near the couplings.



HALOGENATED HYDROCARBON HAZARD

Never use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents, or fluids containing such solvents in these regulators. In the unlikely event that there is a diaphragm failure **and** the vent hole in the aluminum spring cap is plugged, a serious chemical reaction could occur, with the possibility of explosion, which could cause death, serious injury, and/or substantial property damage.

Consult your fluid suppliers to ensure that the fluids used are compatible with aluminum parts.



TOXIC FLUID HAZARD

Graco does not manufacture or supply the reactive chemical components that may be used in this equipment and is not responsible for injury or property loss, damage, expense or claims (direct or consequential) that arise from the use of such chemical components.

Important Acid Catalyst Information

Regulator model 26A086 is designed for acid catalyst ("acid") currently used in two-component, wood finishing materials. Current acids in use (with pH levels as low as 1) are more corrosive than earlier acids. More corrosion-resistant wetted materials of construction are required, and must be used without substitution, to withstand the increased corrosive properties of these acids.

WARNING



Acid is flammable, and spraying or dispensing acid creates potentially harmful mists, vapors, and atomized particulates. To help prevent fire and explosion and serious injury:



- Read and understand the fluid manufacturer's warnings and Safety Data Sheet (SDS) to know specific hazards and precautions related to the acid.
- Use only genuine, manufacturer's recommended acid-compatible parts in the catalyst system (hoses, fittings, etc.). A reaction may occur between any substituted parts and the acid.
- To prevent inhalation of acid mists, vapors, and atomized particulates, everyone in the work area must wear appropriate respiratory protection. Always wear a properly fitting respirator, which may include a supplied-air respirator. Ventilate the work area according to instructions in the acid manufacturer's SDS.
- Avoid all skin contact with acid. Everyone in the work area must wear chemically impermeable gloves, protective clothing, foot coverings, aprons, and face shields as recommended by the acid manufacturer and local regulatory authority. Follow all fluid manufacturer recommendations, including those regarding handling of contaminated clothing. Wash hands and face before eating or drinking.
- Regularly inspect equipment for potential leaks and remove spills promptly and completely to avoid direct contact or inhalation of the acid and its vapors.
- Keep acid away from heat, sparks, and open flames. Do not smoke in the work area. Eliminate all ignition sources.
- Store acid in the original container in a cool, dry, and well-ventilated area away from direct sunlight and away from other chemicals in accordance with acid manufacturer's recommendation. To avoid corrosion of containers, do not store acid in substitute containers. Reseal the original container to prevent vapors from contaminating the storage space and surrounding facility.

Moisture Sensitivity of Acid Catalysts

Acid catalysts can be sensitive to atmospheric moisture and other contaminants.

Notice

Acid build-up will damage the seals and reduce the performance and life of the regulator. To prevent exposing acid to moisture:

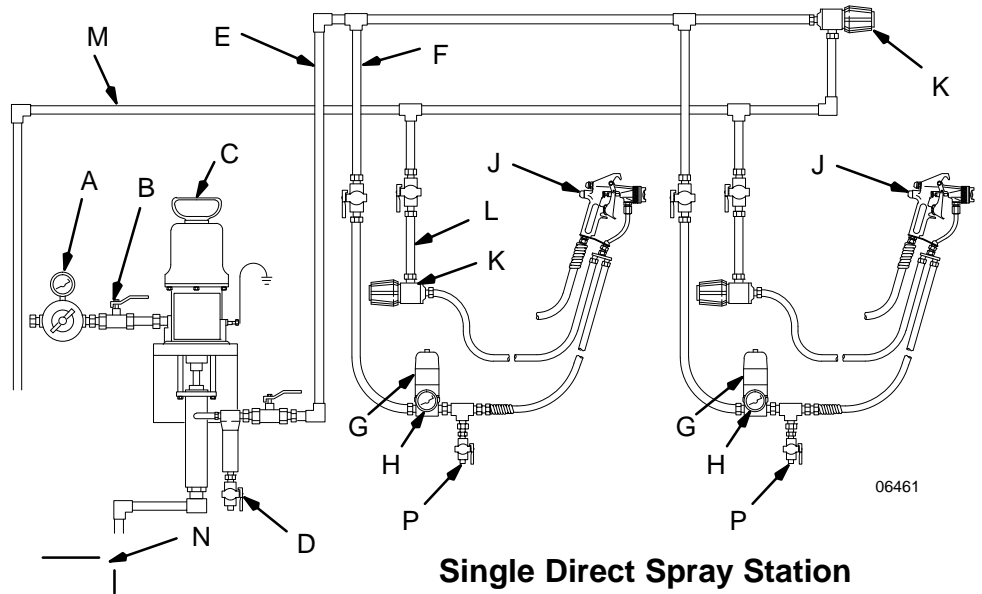
- Always use a sealed container with a desiccant dryer in the vent, or a nitrogen atmosphere. Never store acids in an open container.
- Use only moisture-proof hoses compatible with acids.
- Always lubricate threaded parts with an appropriate lubricant when reassembling.

Installation

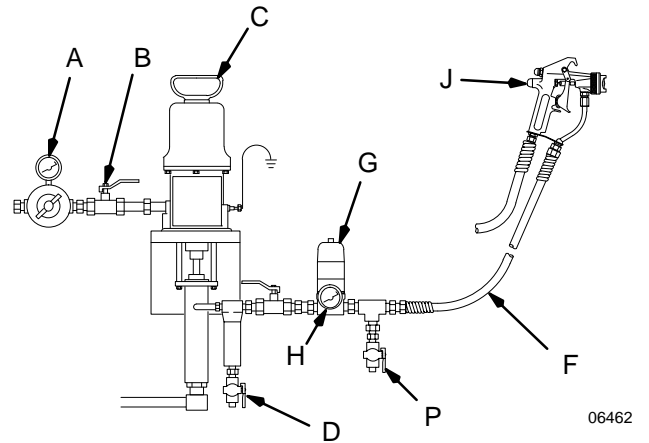
Multiple Circulating Spray Station

Key

- A Air regulator
- B Bleed-type master air valve
- C Pump
- D Fluid filter and drain valve
- E Main fluid supply line
- F Gun fluid supply line
- G Fluid regulator with fluid pressure gauge (H)
- H Fluid pressure gauge
- J Air-assisted airless spray gun
- K Back pressure valve
- L Fluid return line
- M Main circulating line
- N Fluid supply container
- P Drain valve



Single Direct Spray Station



⚠ WARNING

Do not use PTFE tape on pipe threads. Such use could cause a hazardous condition due to loss of grounding continuity. Also, if pieces of the tape break off, the function of the regulator could be affected.

Fig. 1

The installations shown in Fig. 1 are only a guide for selecting and installing a circulating or direct system; they are not actual system designs. Contact your Graco distributor for assistance in designing a system to suit your needs.

NOTE: Before you install the regulator, thoroughly flush the system to remove metal chips and other contaminants. A fluid filter (D) of 60-mesh or finer should always be installed upstream of the regulator.

Connections

Install the fluid regulator (G) in the spray gun fluid supply line (F), as shown in the typical installation drawings on this page. Connect **only one** spray gun or dispensing valve to each fluid regulator.

Apply pipe sealant to the male pipe threads, and connect the fluid supply line (F) to the fluid regulator's 3/8 npt(f) inlet. Connect the line from the gun (J) to the fluid regulator's 3/8 npt(f) outlet. Install the gauge or plug into the 1/4 npt(f) gauge port.

Make sure the direction of fluid flow agrees with the **IN** and **OUT** markings on the regulator body.

Flush the System

The regulator was tested in lightweight oil. Flush the entire system with a solvent compatible with the fluid being dispensed. Then test the system.


Mounting Bracket

A Mounting Bracket is available for mounting the regulator. Order Part 222515 for the bracket and mounting hardware.

Installation

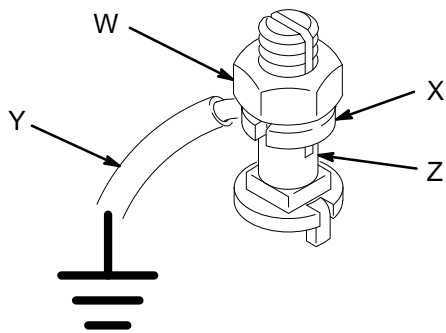
Grounding the System

⚠ WARNING



FIRE AND EXPLOSION HAZARD
Before operating the fluid pressure regulator, ground the system as explained below.

Pump: Use a ground wire and clamp. Loosen the grounding lug locknut (W) and washer (X). Insert one end of a 1.5 mm² (12 ga) minimum ground wire (Y) into the slot in lug (Z) and tighten the locknut securely. Connect the other end of the wire to a true earth ground. Order Part 237569 Ground Wire and Clamp.



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Fig. 2

Air and fluid hoses: Use only electrically conductive hoses.

Heaters, if used: See the heater instruction manual.

Air compressor: Follow manufacturer's recommendations.

Spray gun: Ground through connection to a properly grounded fluid hose and pump.

Fluid supply container: Follow your local code.


Object being sprayed: Follow your local code.

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

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

Pressure Relief Procedure

⚠ WARNING



SKIN INJECTION HAZARD
The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. Fluid under high pressure can be injected through the skin and cause serious injury. To reduce the risk of an injury from injection, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you

- Are instructed to relieve the pressure
- Stop spraying
- Check or service any of the system equipment
- Install or clean the spray tips

Operation

Adjusting the System Pressure

CAUTION

- The new system **must** be cleaned and tested thoroughly before admitting fluid to the regulator to avoid contaminants clogging or damaging the regulator.
- **Always** use the lowest possible air and fluid pressures for your application. High pressures can cause premature spray tip, regulator, and pump wear.

NOTES:

- The fluid pressure regulator controls pressure downstream from its outlet.
 - If you are using an accessory fluid pressure gauge (H in Fig. 1), relieve the spray gun line pressure after you reduce the regulator pressure to ensure a correct gauge reading.
1. Make a note of the proper way to adjust pressure, from the following descriptions:
 - On a spring-operated regulator, turn the adjusting screw (10) *counterclockwise* to decrease pressure and *clockwise* to increase pressure to the spray gun or extruder gun.
 - On an air-operated regulator, increase supply air pressure to increase fluid pressure. Decrease supply air pressure to decrease fluid pressure. Supply air up to 100 psi (0.7 MPa, 7 bar). See the chart on page 22 for air versus fluid pressure.

NOTE: Air-operated regulator Models 238893 and 238894 are provided with an air supply regulator (31) to control the fluid set pressure. For increased sensitivity in pressure set point performance, an alternative air regulator, such as Part 206197, may be used. This alternative air regulator uses a sensitive diaphragm design to maintain a higher, more accurate air pressure setting.

2. Adjust the pump air pressure and fluid regulator for the desired spray pattern. Use the lowest possible air and fluid pressures for your application. For optimum performance, the inbound fluid pressure should be at least 500 psi (3.4 MPa, 34 bar) above the regulated fluid pressure.

NOTE: Do not exceed a 2000 psi (14 MPa, 138 bar) pressure drop between the regulator inlet and outlet. Excessive pressure drop will cause premature regulator component wear.

For example: With 3500 psi (24.5 MPa, 245 bar) to the regulator, the minimum regulated outlet pressure would be 1500 psi (10.5 MPa, 105 bar).

3. *In a circulating system*, also adjust the back pressure valve (K).
4. Record all the settings for future reference.

Cleaning the Regulator

Do not allow fluid to settle in the system.

Flush the regulator whenever the rest of the system is flushed (see page 10). Before you flush the system, follow the **Pressure Relief Procedure** on page 8, then completely decrease the regulated fluid pressure. See step 1 in **Adjusting the System Pressure**, at left.

Before you remove the regulator for thorough cleaning and inspection, follow the **Pressure Relief Procedure** on page 8. Then remove the regulator, clean it, and inspect all parts.

Operation

Flushing

- Flush before changing colors, before fluid can dry in the equipment, at the end of the day, before storing, and before repairing equipment.
 - Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.
 - Flush with a fluid that is compatible with the fluid being dispensed and the equipment wetted parts.
1. Record the pressure adjustment setting of the fluid regulator before flushing.
 2. Shut off the pump and relieve fluid pressure in the system by triggering the gun and opening the back pressure regulator or other bypass valve.
 3. Never exceed the maximum working pressure of the lowest rated system component. Remove the gauge if the flushing pressure will exceed the gauge range.
 4. Open the fluid regulator fully.
 - a. *Spring Operated Regulators Only:* Open the fluid regulator by turning the adjusting screw (10) fully *clockwise*.
 - b. *Air Operated Regulator Only:* Increase the air regulator setting to fully open the fluid regulator. You will have to reset the fluid regulator's pressure setting after flushing.
 5. Supply solvent to the system. Set pump to the lowest possible pressure, and start pump.
 6. Flush until thoroughly clean.
 7. Adjust the fluid regulator to the desired setting.
 - a. *Spring Operated Regulators Only:* Turn the adjustment screw (10) *counterclockwise* to return to the desired pressure setting.
 - b. *Air Operated Regulator Only:* Adjust the air regulator to return to the desired fluid pressure setting.

Troubleshooting

WARNING

To reduce the risk of serious bodily injury, including skin injection, splashing in the eyes or on the skin, or injury from moving parts, always follow the **Pressure Relief Procedure** on page 5 whenever the pump is shut off, before installing, cleaning, adjusting, removing, or servicing the valve or any part of the system, and whenever you stop dispensing.

NOTE: Check all possible solutions in the chart below before you disassemble the regulator.

Problem	Cause	Solution
No pressure regulation	Damaged diaphragm	Replace diaphragm.
	Leaking or dirty seat	Replace cartridge, or clean seat.
No fluid flow	Damaged valve actuator	Replace valve actuator.
Pressure creeps above setting	Metal chip or contamination between ball and seat	Replace cartridge, or clean seat area.
	Damaged diaphragm	Replace diaphragm.
	Damaged o-ring or improper seal	Replace the o-ring under the seat.
	Damaged or clogged air regulator or line (air-operated regulator only)	Clear obstruction in line. Service regulator if necessary.
	Leaking or dirty seat	Replace cartridge, or clean seat.
Pressure drops below setting	Large change in inlet pressure	Stabilize regulator inlet pressure.
	Empty/clogged supply line	Fill/flush supply line.
	Damaged or clogged air regulator or line (air-operated regulator only)	Clear obstruction in line. Service regulator if necessary.
	Using valve beyond its rated flow capacity	Install valve for each spray gun or dispensing valve.
Fluid leaks from spring housing	Large change in inlet pressure	Stabilize regulator inlet pressure.
	Loose fluid housing	Tighten the four cap screws.
Chatter	Damaged diaphragm	Replace diaphragm.
	Excessive pressure differential between pump and gun	Reduce pump pressure to not more than 2000 psi (14 MPa, 138 bar) greater than required gun pressure.
	Excessive flow rate	Reduce fluid flow through regulator. Connect only one spray gun or dispensing valve to each fluid regulator.

Service

Service Kits

For the Fluid Diaphragm Repair Kit, order Part 238747. Parts included in this kit are marked with an asterisk, for example (7*), in the **Parts Drawings and Lists** on pages 15 and 17.

For the Cartridge Repair Kit, order Part 238748 for all models except 248090. Parts included in this kit are marked with a dagger, for example (3†), in the **Parts Drawings and Lists** on pages 15 and 17.

For the Cartridge Repair Kit for 248090, order Part 248098. Parts included in this kit are marked with a checkmark, for example (3✓), in the **Parts Drawings and Lists** on pages 15 and 17.

To convert from a spring-operated to an air-operated regulator, order the Air-Operated Conversion Kit, Part 238749. Parts included in this kit are marked with a double dagger, for example (37‡), in the **Parts Drawings and Lists** on pages 15 and 17.

NOTE: To convert from a medium-pressure-range, spring-operated model to a high-pressure-range, spring-operated model (or vice versa), order the appropriate spring (11) from the **Parts List** on page 16.

Installing the Air-Operated Conversion Kit

(See **Parts Drawings** on pages 15–17)

1. Relieve the pressure.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

2. On the spring-operated regulator, turn the adjusting screw (10) *counterclockwise* until it is loose enough to fully relieve the spring tension.
3. Use a strap wrench or an equivalent wrench to loosen and remove the spring cover (2), spring retainers (6 and 27), and spring (11).
4. Place the stabilizing spring (22) of the air-operated regulator on the piston rod (6). Install the conversion kit assembly onto the backing plate (8). Torque to 15 to 20 ft-lb (20 to 27 N•m).
5. Plumb an air line up to the 1/4 npt(m) threads of the nipple (35) on the air regulator.
6. Flush the system (see page 10), and set the regulator pressure by following the procedure in **Adjusting the System Pressure** on page 9.

Service

Replacing the Fluid Diaphragms

See Fig. 3, and follow the steps below. For parts that are not called out in Fig. 3, see the **Parts Drawing** on page 15.

1. **Relieve the pressure**, and remove the regulator from the fluid line.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

2. Turn the adjusting screw (10) *counterclockwise* until it is loose to fully relieve the spring tension.
3. Remove the four base housing screws (9) from the base housing (4), and pull the base housing free of the backing plate (8).
4. Remove the diaphragm and valve actuator subassembly (1, 7, 12, 13, and 19).
5. Clean and inspect the bore in the backing plate (8) for wear, and replace it if necessary.

6. Remove the o-ring (17) from the groove in the base housing (4), clean and inspect the base housing, and replace if necessary.
7. Install a new o-ring (17) in the groove in the base housing (4).
8. Lightly lubricate the backing plate (8) bore and plunger (7) with a lithium-based grease.
9. Install the new, pre-assembled diaphragm subassembly into the backing plate (8).

NOTE: The diaphragms will have a bow in them before you install them.

10. Align the holes in the diaphragms with the backing plate (8).
11. Install the backing plate/diaphragms assembly over the base housing (4). Hold the backing plate (8) tightly against the base housing, and install the four base housing screws (9).
12. Torque the base housing screws (9) first to 20 to 25 ft-lb (27 to 34 N•m), then to 30 to 35 ft-lb (41 to 48 N•m) in the sequence shown in Fig. 3.

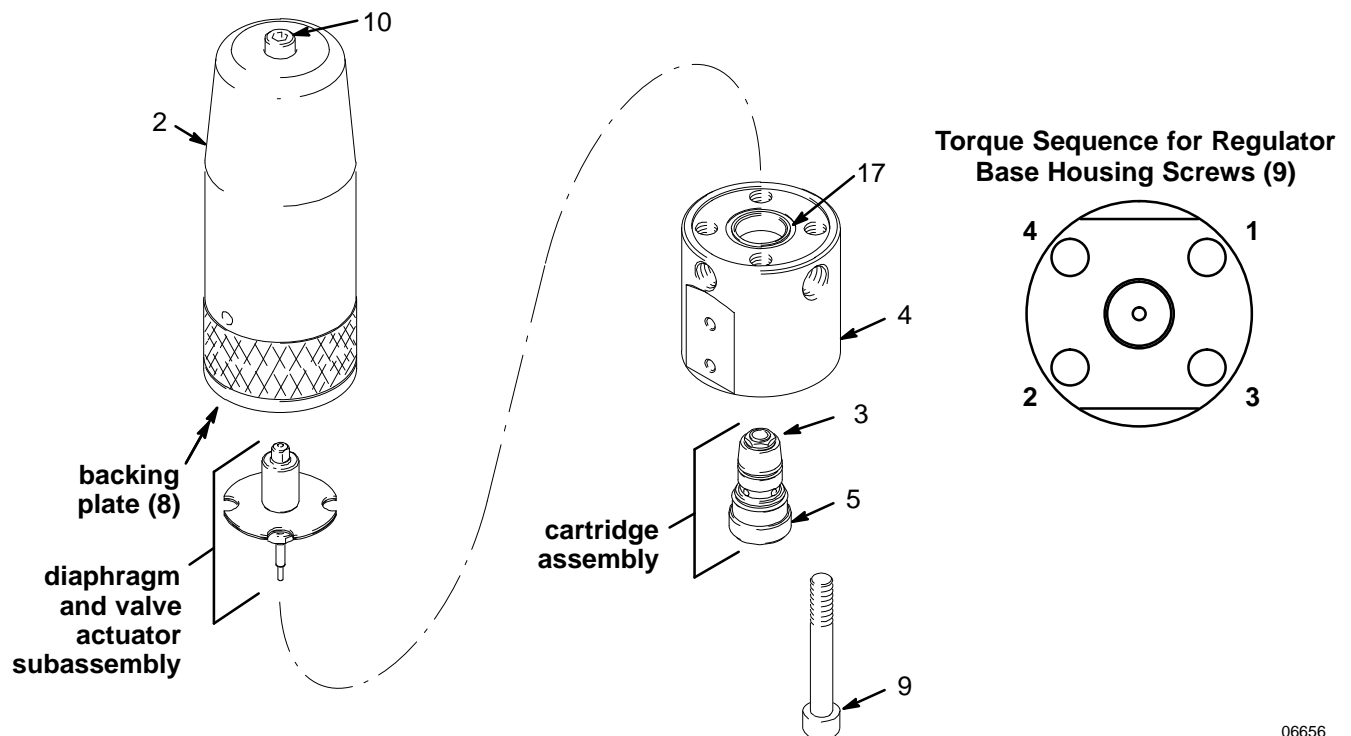


Fig. 3

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Service

Replacing the Cartridge

See Fig. 3, and follow the steps below. For parts that are not called out in Fig. 3, see the **Parts Drawing** on page 15.

CAUTION

Handle the hard carbide parts, which are the ball (16), valve actuator (1), and valve seat (14), carefully to avoid damaging them.

1. Relieve the pressure.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

2. Remove the cartridge assembly by loosening the valve housing (5) with a 6 mm hex wrench and pulling the cartridge assembly out of the base housing (4).

NOTE: The retaining nut (3) often loosens when removing the cartridge assembly from the base housing. Be sure to re-torque as described in step 4.

3. Inspect and clean the internal walls of the base housing (4).

NOTE: Be careful that you do not scrape or gouge the internal walls of the base housing, because they are sealing surfaces.

4. Re-torque the retaining nut (3) to 140 to 160 in-lb (16 to 18 N•m).

NOTE: You must re-torque the retaining nut **before** you install it in the base housing in step 5.

5. Install the new cartridge assembly in the base housing (4), and torque the valve housing (5) to 30 to 35 ft-lb (41 to 48 N•m).

NOTE: The valve seat (14) is double sided and may be reversed for extended life. The o-rings (15, 18 and 20) and ball (16) must be replaced.

Parts Drawing

Models 238889, 238890, 238891, 238892, and 26A086

238889 with EZ Flush gauge port plug
 238890 with fluid pressure gauge
 26A086 with 316 17-4 wetted parts for acid applications

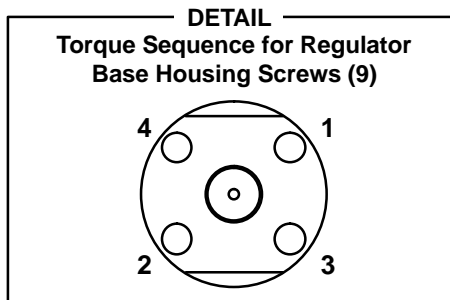
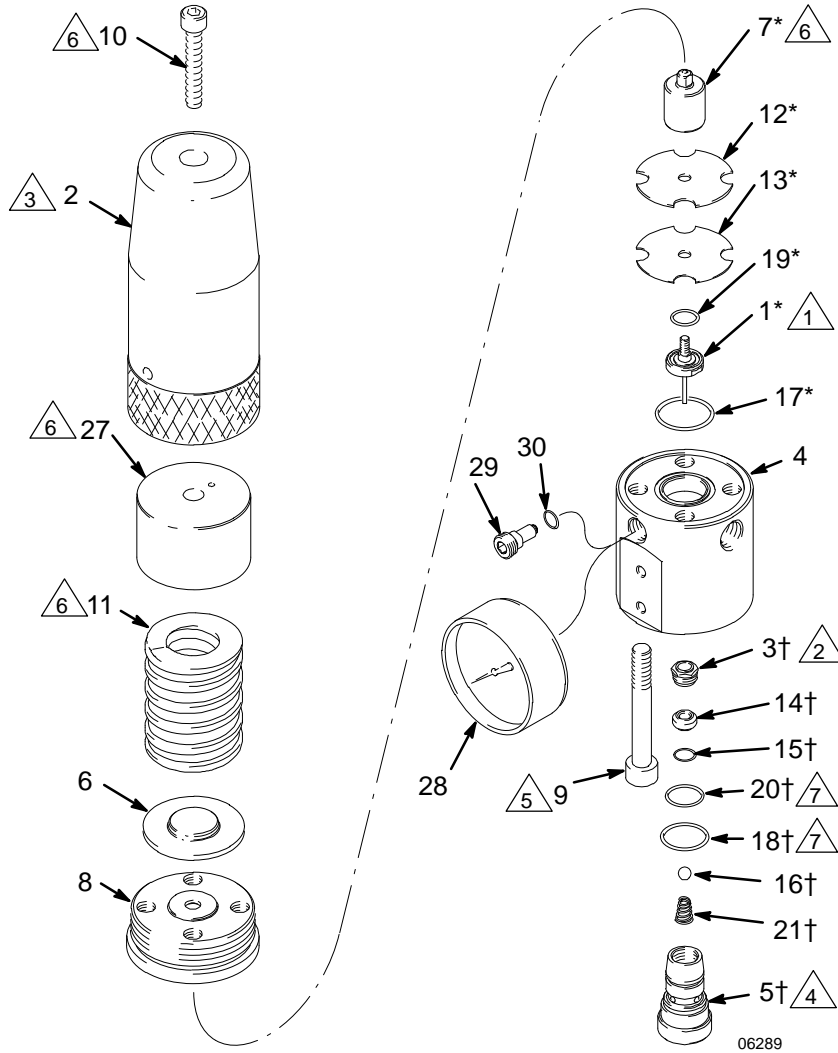
Spring-Operated Regulator

500 to 3000 psi (3.4 to 21 MPa, 34 to 207 bar)
 Regulated Fluid Outlet Pressure

238891 with EZ Flush gauge port plug
 238892 with fluid pressure gauge

Spring-Operated Regulator

3000 to 5000 psi (21 to 34 MPa, 207 to 345 bar)
 Regulated Fluid Outlet Pressure



- △1 Torque to 25 to 30 in-lb (2.8 to 3.4 N•m).
- △2 Torque to 140 to 160 in-lb (16 to 18 N•m).
- △3 Torque to 10 to 20 ft-lb (14 to 27 N•m).
- △4 Torque to 30 to 35 ft-lb (41 to 48 N•m).
- △5 Torque first to 20 to 25 ft-lb (27 to 34 N•m), then to 30 to 35 ft-lb (41 to 48 N•m) in the sequence shown in DETAIL at left.
- △6 Apply lithium-based grease when reassembling.
- △7 Apply a fluid-compatible grease to aid in reassembly.

Parts List

Models 238889, 238890, 238891, 238892, and 26A086

Ref.	Part No.	Description	Qty.	Ref.	Part No.	Description	Qty.
1	*	ACTUATOR	1	18†	107079	O-RING, packing; PTFE 019	1
2	238858	COVER, spring	1	19	*	O-RING, packing; PTFE 013	1
3†	191577	NUT, spring retainer	1	20†	109450	O-RING, packing; PTFE 016	1
	17M079	NUT, spring retainer <i>for Model 26A086</i>	1	21†	111858	SPRING, compression	1
4	191578	BASE HOUSING; sst	1		17M078	SPRING, compression <i>for Model 26A086</i>	1
	17M080	BASE HOUSING; sst <i>for Model 26A086</i>	1	23	113634	WRENCH, hex; 6 mm <i>(not shown)</i>	1
5†	191579	VALVE HOUSING; sst	1	27	191919	RETAINER, spring, sleeve	1
6	191580	RETAINER, spring, guide	1	28	113641	GAUGE, pressure <i>for Model 238890</i>	1
7	*	PLUNGER, spring	1		113654	GAUGE, pressure <i>for Model 238892</i>	1
8	191583	PLATE, backing	1	29	238896	PLUG, EZ Flush (includes Ref. 30) <i>for Models 238889 & 238891</i>	1
9	113623	BASE HOUSING SCREW, cap, socket-head; M10 x 1.5 x 70	4	30	107509	O-RING, packing; PTFE 007	1
10	113624	ADJUSTING SCREW, cap, socket-head; M8 x 1.25 x 45	1	31	128658	PIPE PLUG 1/4" 316 SST <i>for Model 26A086 only</i>	1
11‡	113625	SPRING, compression; red <i>for Models 238889 & 238890</i>	1				
	113626	SPRING, compression; yellow <i>for Models 238891, 238892, and 26A086</i>	1				
12	*	DIAPHRAGM, regulator; TPE cream colored	1				
13	*	DIAPHRAGM, regulator; PTFE white	1				
14†	191914	SEAT, valve	1				
	17M081	SEAT, valve <i>for Model 26A086</i>	1				
15†	113651	O-RING, packing; PTFE	1				
16†	112365	BALL	1				
	17M075	BALL <i>for Model 26A086</i>	1				
17*	109213	O-RING, packing; PTFE 025	1				

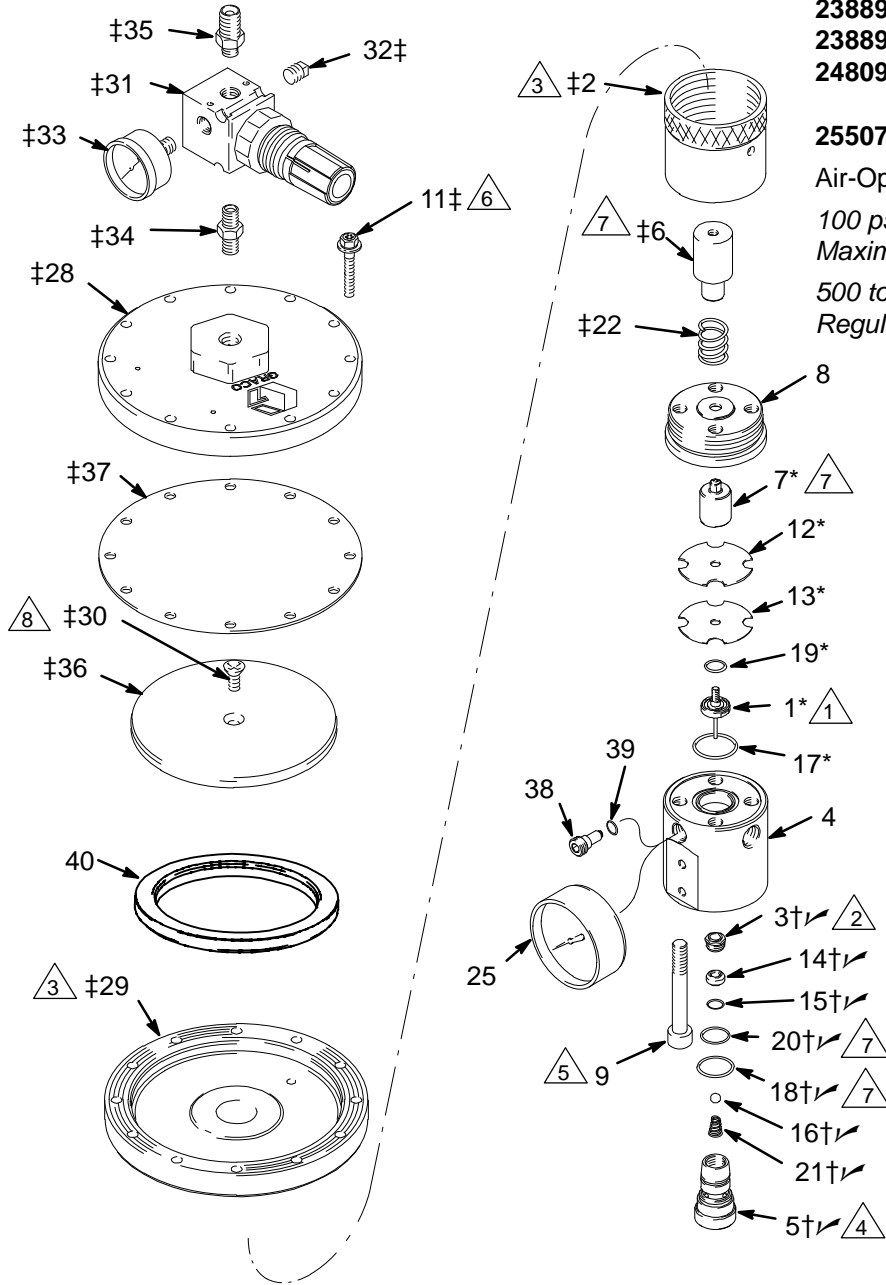
* *Included in Fluid Diaphragm Repair Kit 238747 (Models 238889, 238890, 238891, and 238892) and Fluid Diaphragm Repair Kit 17M565 (Model 26A086)*

† *Included in Cartridge Repair Kit 238748 (Models 238889, 238890, 238891, and 238892) and Cartridge Repair Kit 17M566 (Model 26A086)*

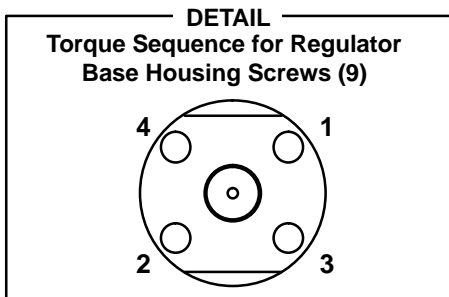
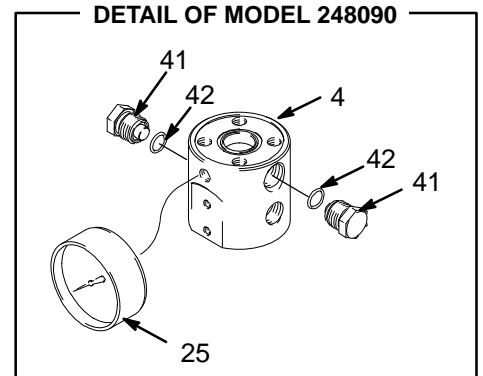
‡ *To convert to a higher or lower pressure range, order one of the following compression springs:*
 113625 *500 to 3000 psi*
 (3.4 to 21 MPa, 34 to 207 bar)
 113626 *3000 to 5000 psi*
 (21 to 34 MPa, 207 to 345 bar)

Parts Drawing

Models 238893, 238894, 248090, and 255072



238893 with EZ Flush gauge port plug
 238894 with fluid pressure gauge
 248090 with fluid pressure gauge for
 LASD material
 255072 High Resolution
 Air-Operated Regulator
 100 psi (0.7 MPa, 7 bar)
 Maximum Inbound Air Pressure
 500 to 4000 psi (3.4 to 28 MPa, 34 to 276 bar)
 Regulated Fluid Outlet Pressure



- 1 Torque to 25 to 30 in-lb (2.8 to 3.4 N•m).
- 2 Torque to 140 to 160 in-lb (16 to 18 N•m).
- 3 Torque to 15 to 20 ft-lb (20 to 27 N•m).
- 4 Torque to 30 to 35 ft-lb (41 to 48 N•m).
- 5 Torque first to 20 to 25 ft-lb (27 to 34 N•m), then to 30 to 35 ft-lb (41 to 48 N•m) in the sequence shown in DETAIL at left.
- 6 First torque to 30–33 in-lb (3.4–3.7 N•m) in alternating pattern then torque to 68–72 in-lb (7.7–8.1 N•m) in alternating pattern.
- 7 Apply lithium-based grease when reassembling.
- 8 Torque to 75 to 80 in-lb (8.4 to 9.0 N•m).

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Parts List

Models 238893, 238894, 248090, and 255072

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	*	ACTUATOR	1	21†✓	111858	SPRING, compression	1
2‡	191584	HOUSING ADAPTER	1	22‡	160062	SPRING, stabilizing	1
3†✓	191577	NUT, spring retainer	1	25	113654	GAUGE, pressure	
4	191578	HOUSING, base, <i>for Models 238893 and 238894</i>	1			<i>for Models 238894 and 248090</i>	1
	197952	HOUSING, base, <i>for Model 248090</i>	1	28‡◆	—	COVER, diaphragm	1
	15J923	HOUSING, base, <i>for Model 255072</i>	1	29‡◆	—	HOUSING, diaphragm	1
5†✓	191579	VALVE HOUSING, sst	1	30‡	100326	SCREW, machine	1
	15J924	VALVE HOUSING, <i>for Model 255072</i>	1	31‡	110341	REGULATOR, air	1
6‡	191585	ROD, piston, <i>for Models 238893, 238894, and 248090</i>	1	32‡	100403	PLUG, pipe	1
	15J920	ROD, piston, <i>for Model 255072</i>	1	33‡	108190	GAUGE, pressure, air	1
7	*	PLUNGER, spring	1	34‡	103656	NIPPLE, pipe, hex	1
8	191583	PLATE, backing	1	35‡	151519	NIPPLE, reducing; 1/4 x 1/8 npt	1
9	113623	BASE HOUSING SCREW, cap, socket-head; M10 x 1.5 x 70	4	36‡	192194	WASHER, support	1
11‡◆	114104	SCREW, machine	12		15J921	WASHER, <i>for Model 255072</i>	1
12	*	DIAPHRAGM, regulator; TPE cream colored	1	37‡◆	180979	DIAPHRAGM; nylon, <i>for Models 238893, 238894, and 248090</i>	1
13	*	DIAPHRAGM, regulator; PTFE white	1	38	238896	PLUG, EZ Flush (includes Ref. 39) <i>for Model 238893</i>	1
14†✓	191914	SEAT, valve	1	39	107509	O-RING, packing; PTFE 007 <i>for Model 238893</i>	1
15†✓	113651	O-RING, packing; PTFE	1	40	15J922	RING, diaphragm, <i>for Model 255072</i>	1
16†	112365	BALL, <i>for Models 238893 and 238894</i>	1	41	198241	PLUG, pressure <i>for Models 248090 and 255072</i>	2
16✓	15D092	BALL, <i>for Models 248090 and 255072</i>	1	42	111457	PACKING, o-ring; PTFE 012 <i>for Models 248090 and 255072</i>	2
17*	109213	O-RING, packing; PTFE 025	1			* <i>Included in Fluid Diaphragm Repair Kit 238747</i>	
18†✓	107079	O-RING, packing; PTFE 019	1			† <i>Included in Cartridge Repair Kit 238748</i>	
19	*	O-RING, packing; PTFE 013	1			‡ <i>Included in Air-Operated Conversion Kit 238749</i>	
20†✓	109450	O-RING, packing; PTFE 016	1			✓ <i>Included in Cartridge Repair Kit 248098</i>	
						◆ <i>Included in Diaphragm Housing Repair Kit 16P596.</i>	

Parts Drawing

Model 244734

244734 with EZ Flush gauge port plug

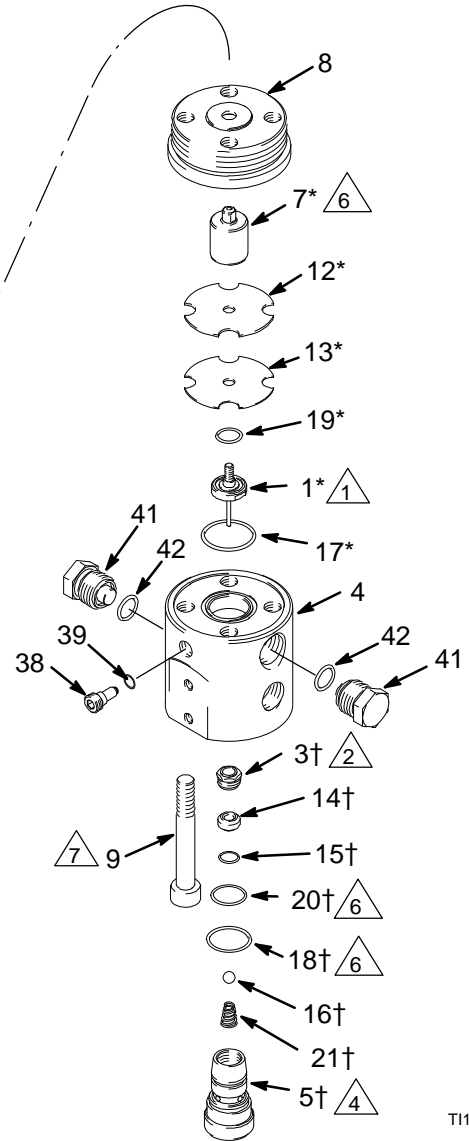
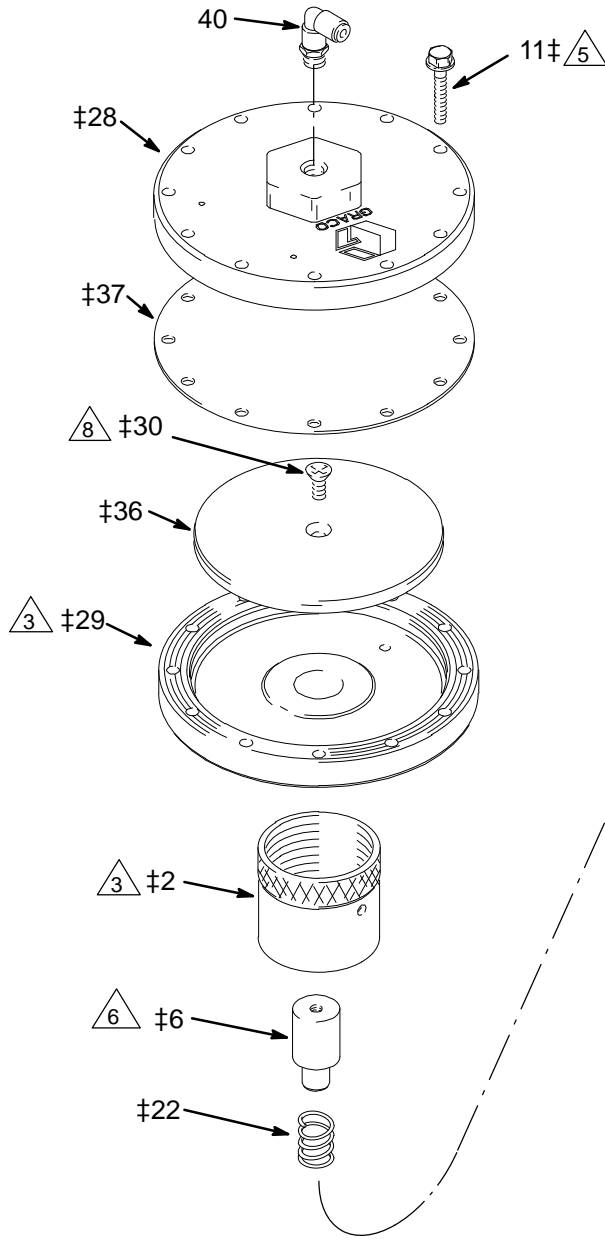
Air-Operated Regulator, Full Range

100 psi (0.7 MPa, 7 bar)

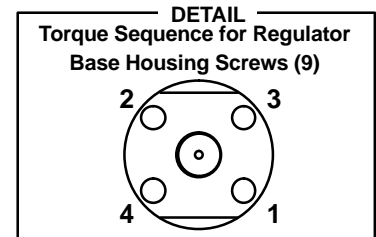
Maximum Inbound Air Pressure

500 to 4000 psi (3.4 to 28 MPa, 34 to 276 bar)

Regulated Fluid Outlet Pressure



- △1 Torque to 25 to 30 in-lb (2.8 to 3.4 N•m).
- △2 Torque to 140 to 160 in-lb (16 to 18 N•m).
- △3 Torque to 15 to 20 ft-lb (20 to 27 N•m).
- △4 Torque to 30 to 35 ft-lb (41 to 48 N•m).
- △5 First torque to 30–33 in-lb (3.4–3.7 N•m) in alternating pattern then torque to 68–72 in-lb (7.7–8.1 N•m) in alternating pattern.
- △6 Apply lithium-based grease when reassembling.
- △7 Torque first to 20 to 25 ft-lb (27 to 34 N•m), then to 30 to 35 ft-lb (41 to 48 N•m) in the sequence shown in DETAIL at right.
- △8 Torque to 75 to 80 in-lb (8.4 to 9.0 N•m).



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Parts List

Model 244734

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	*	ACTUATOR	1	18†	107079	O-RING, packing; PTFE 019	1
2‡	191584	HOUSING ADAPTER	1	19	*	O-RING, packing; PTFE 013	1
3†	191577	NUT, spring retainer	1	20†	109450	O-RING, packing; PTFE 016	1
4	197952	REGULATOR HOUSING	1	21†	111858	SPRING, compression	1
5†	191579	VALVE HOUSING; sst	1	22‡	160062	SPRING, stabilizing	1
6‡	191585	ROD, piston	1	28‡◆	—	COVER, diaphragm	1
7	*	PLUNGER, spring	1	29‡◆	—	HOUSING, diaphragm	1
8	191583	PLATE, backing	1	30‡	100326	SCREW, machine; 1/4–20 x 1/2	1
9	113623	BASE HOUSING SCREW, cap, socket-head; M10 x 1.5 x 70	4	36‡	192194	WASHER, support	1
11‡◆	114104	SCREW, machine; 1/4–20 x 1.0	12	37‡◆	180979	DIAPHRAGM; nylon	1
12	*	DIAPHRAGM, regulator; PTE cream colored	1	38	238896	PLUG, EZ Flush (includes Ref. 39)	1
13	*	DIAPHRAGM, regulator; PTFE white	1	39	107509	O-RING, packing; PTFE 007	1
14†	191914	SEAT, valve	1	40	198171	FITTING, elbow	1
15†	113651	O-RING, packing; PTFE	1	41	198241	PLUG, pressure	2
16†	15D092	BALL	1	42	111457	PACKING, o-ring; PTFE 012	2
17*	109213	O-RING, packing; PTFE 025	1				

* Included in Fluid Diaphragm Repair Kit 238747
 † Included in Cartridge Repair Kit 248098
 ‡ Included in Air-Operated Conversion Kit 238749
 ◆ Included in Diaphragm Housing Repair Kit 16P596.

Technical Data

	Model 238890 spring operated, with fluid pressure gauge	Model 238892 spring operated, with fluid pressure gauge	Models 238894, 248090, and 255072 air operated, with fluid pressure gauge	Model 244734 air operated, with pressure sensor ports
	Model 238889 spring operated, with EZ Flush plug	Model 238891 spring operated, with EZ Flush plug	Model 238893 air operated, with EZ Flush plug	
	Model 26A086 spring operated, with gauge port			
Maximum fluid inlet pressure	6000 psi (41 MPa, 414 bar)	6000 psi (41 MPa, 414 bar)	6000 psi (41 MPa, 414 bar)	6000 psi (41 MPa, 414 bar)
Regulated fluid outlet pressure range	500–3000 psi (3.4–21 MPa, 34–207 bar)	3000–5000 psi (21–34 MPa, 207–345 bar)	500–4000 psi (3.4–28 MPa, 34–276 bar)	500–4000 psi (3.4–28 MPa, 34–276 bar)
Maximum inbound air pressure	—	—	100 psi (0.7 MPa, 7 bar)	100 psi (0.7 MPa, 7 bar)
Fluid inlet/outlet size	3/8 npt(f)	3/8 npt(f)	3/8 npt(f) 1/2 npt(f) for 248090	1/2 npt(f)
Gauge port size	1/4 npt(f)	1/4 npt(f)	1/4 npt(f)	1/4 npt(f)
Fluid pressure gauge (Models 238890, 238892, and 238894)	0–3000 psi (0–21 MPa, 0–207 bar)	0–5000 psi (0–34 MPa, 0–345 bar)	0–5000 psi (0–34 MPa, 0–345 bar)	—
Maximum flow (in 65 cp material)	2 gpm (7.6 lpm)	2 gpm (7.6 lpm)	2 gpm (7.6 lpm)	2 gpm (7.6 lpm)
Maximum fluid viscosity	up to 15,000 cp	up to 15,000 cp	up to 15,000 cp	up to 15,000 cp
Maximum operating temperature	120° F (50° C)	120° F (50° C)	120° F (50° C)	120° F (50° C)
Weight (with gauge)	7.0 lb (3.2 kg)	7.0 lb (3.2 kg)	11.7 lb (5.3 kg)	11.7 lb (5.3 kg)
Fluid diaphragms	PTFE with TPE backing	PTFE with TPE backing	PTFE with TPE backing	PTFE with TPE backing
Wetted parts (all models)	304, 316, 17–4 passivated SST, nickel– and cobalt–bound tungsten carbide, PTFE for all models; ceramic for models 248090, 244734, and 255072 only.			
Wetted parts (Model 26A086)	316, 17–4 SST, PTFE			
Adjustment tool (spring-operated models)	6 mm hex wrench	6 mm hex wrench	—	—

Technical Data

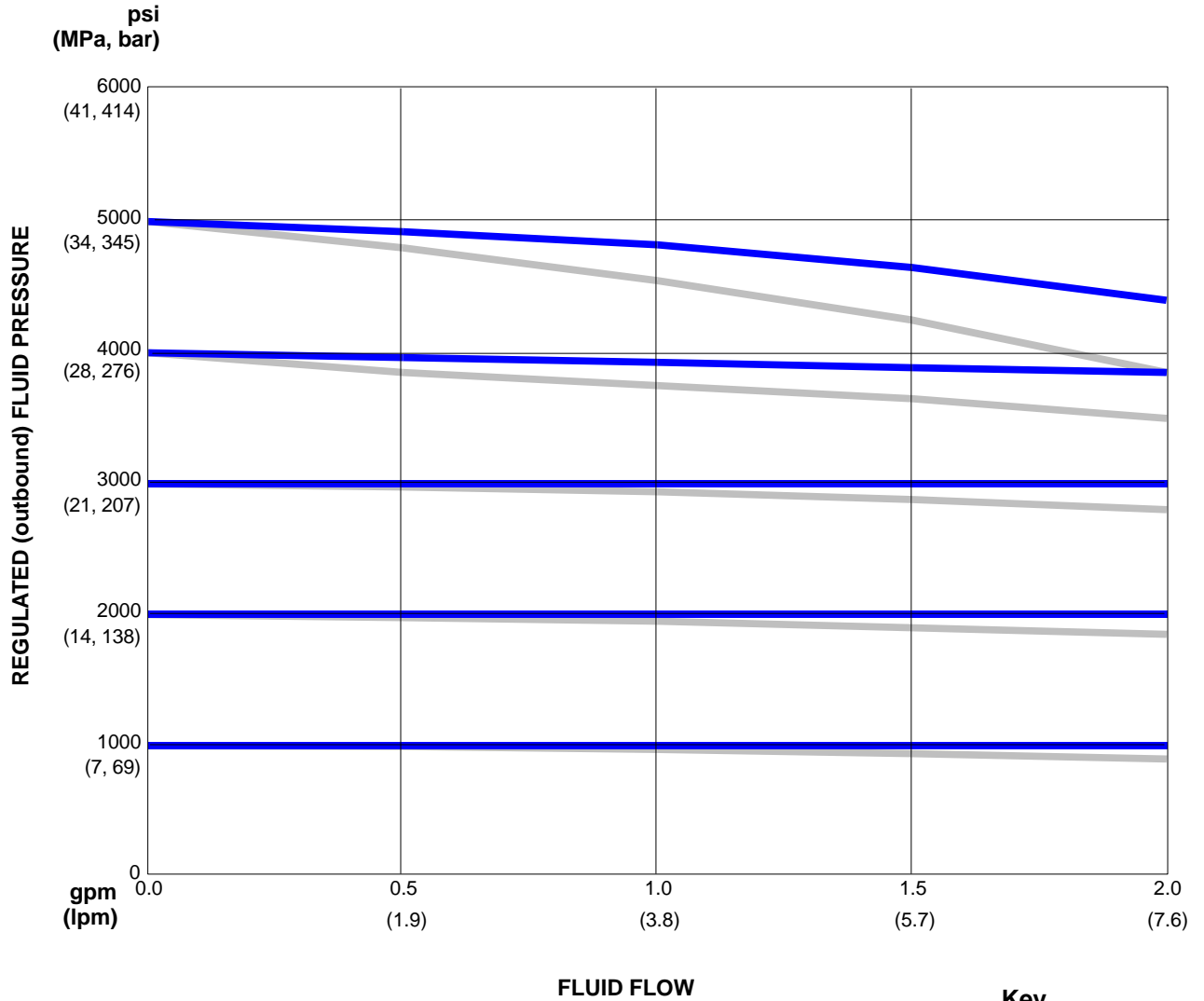
Air Requirements for Air-Operated Regulators (Models 238893, 238894, 248090, and 255072)

The following table shows the approximate air pressure needed to regulate the air-operated regulator to a given fluid outlet pressure.

Air Pressure			Regulated Fluid Outlet Pressure					
			Models 238894, 248090, and 255072			Model 255072		
psi	MPa	bar	psi	MPa	bar	psi	MPa	bar
28	0.19	1.9	1000	7	69	550	4	40
49	0.34	3.4	2000	14	138	1150	8	80
70	0.48	4.8	3000	21	207	1800	12	120
90	0.62	6.2	4000	28	276	2450	17	170
100	0.68	6.8	4000	28	276	2700	19	190

Performance Chart

Fluid Pressure Regulators,
Models 238889 through 238894 and 248090 and
26A086



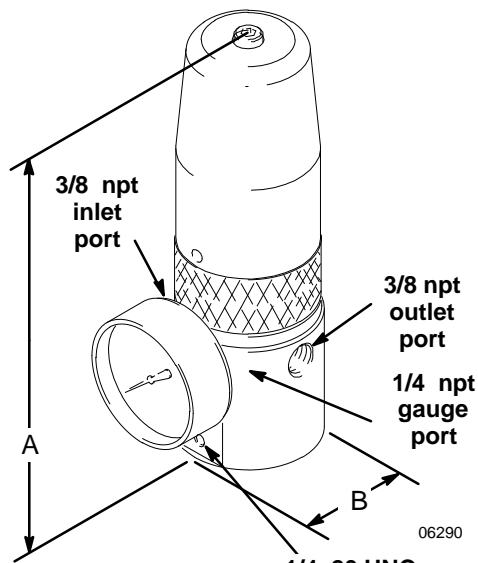
Test Conditions

Regulators tested in oil at 70° F (21° C) and at 6000 psi (41 MPa, 414 bar) inbound fluid pressure.

Key

- 65 cp oil
- 3000 cp oil

Dimensional Drawings



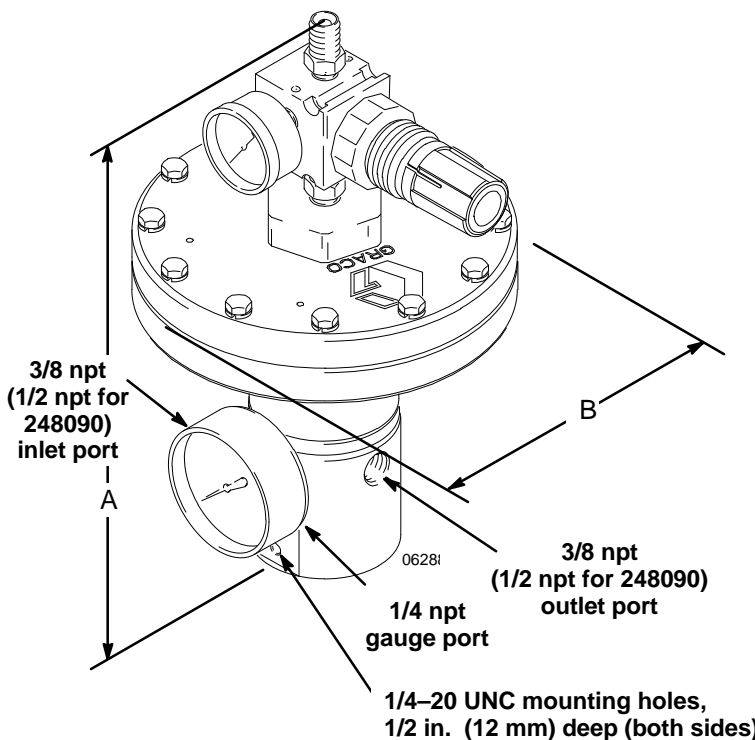
Models 238889 and 238891 with port plug
Models 238890, 238892, and 26A086 with gauge
(spring operated)

- A Height: 8.9 in. (225 mm)
- B Diameter of base housing: 2.65 in. (70 mm)

1/4-20 UNC mounting holes,
 1/2 in. (12 mm) deep (both sides)

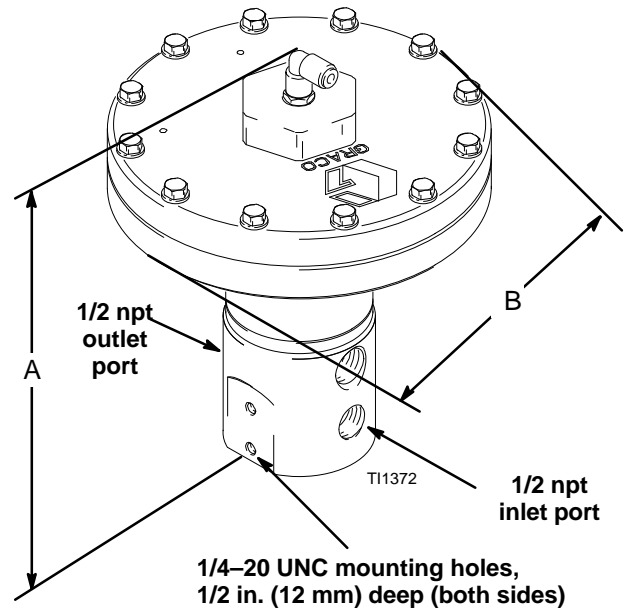
Model 238893 with port plug
Model 238894 with gauge
Models 248090 and 255072 with gauge and
1/2 npt inlet and outlet ports
(air operated)

- A Height: 10.0 in. (254 mm)
- B Diameter of diaphragm cover: 7.0 in. (179 mm)



Model 244734
(air operated)

- A Height: 8.1 in. (206 mm)
- B Diameter of diaphragm cover: 7.0 in. (179 mm)



1/4-20 UNC mounting holes,
 1/2 in. (12 mm) deep (both sides)

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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.

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Original instructions. This manual contains English. MM 308647

Graco Headquarters: Minneapolis

International Offices: Belgium, China, Japan, Korea

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