

Instructions-Parts



Fluid Pressure Regulators

**Stainless Steel, Waterbase-Compatible,
High-Pressure**

308647T

EN

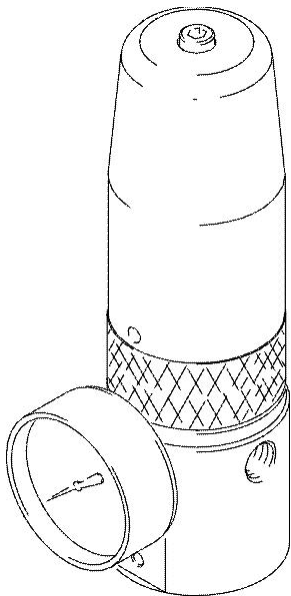
For precise downstream pressure and flow control to dispensing devices. For professional use only.

See page 3 for model information, including maximum working pressure.



Important Safety Instructions

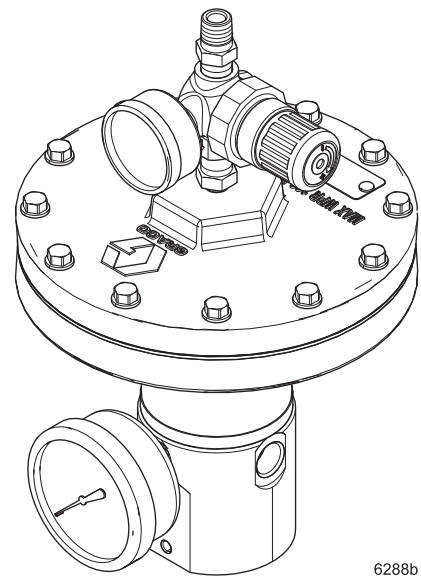
Read all warnings and instructions in this manual before using the equipment.
Save these instructions.



06290

**Model 238890, 238892
(spring-operated)**

**Model 26A086
(acid-compatible)**



6288b

**Model 238894
(air-operated)**

U.S. Patent No. 494899

Contents

Models	3	Service	13
Safety Symbols	4	Service Kits	13
General Warnings	5	Prepare Equipment for Service	13
Important Acid Catalyst Information	7	Install the Air-Operated Conversion Kit	13
Acid Catalyst Conditions	7	Replacing the Fluid Diaphragms	13
Moisture Sensitivity of Acid Catalysts	7	Replacing the Cartridge	15
Installation	8	Parts	16
Connections	9	Models 238889, 238890, 238891, 238892, and 26A086	16
Flush the System	9	Models 238893, 238894, 248090, and 255072 .	18
Mounting Bracket	9	Model 244734	20
Grounding	9	Technical Specifications	22
Operation	10	Air Requirements for Air-Operated Regulators (Model 238893, 238894, 248090, and 255072)	23
Pressure Relief Procedure	10	California Proposition 65	23
Adjusting the System Pressure	10	Performance Data	24
Cleaning the Regulator	11	Dimensional Drawings	25
Flushing Procedure	11	Graco Standard Warranty	26
Troubleshooting	12		

Models

Spring-Operated


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

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)

Safety Symbols

The following safety symbols appear throughout this manual and on warning labels. Read the table below to understand what each symbol means.

Symbol	Meaning
	Chemical Hazard
	Equipment Misuse Hazard
	Fire and Explosion Hazard
	Skin Injection Hazard
	Skin Injection Hazard
	Splash Hazard
	Toxic Fluid or Fumes Hazard
	Ground Equipment

Symbol	Meaning
	Read Manual
	Follow Pressure Relief Procedure
	Ventilate Work Area
	Wear Personal Protective Equipment
	Eliminate Ignition Sources
	Do Not Stop Leaks with Hand, Body, Glove or Rag
	Do Not Place Hands or Other Body Parts Near Fluid Outlet






Safety Alert Symbol




This symbol indicates: Attention! Become Alert! Look for this symbol throughout the manual to indicate important safety messages.

General Warnings

The following warnings apply throughout this manual. Read, understand, and follow the warnings before using this equipment. Failure to follow these warnings can result in serious injury.

 <h2 style="margin: 0;">WARNING</h2>	
	<p>SKIN INJECTION HAZARD</p> <p>High-pressure fluid from gun, 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 spray without tip guard and trigger guard installed. • Engage trigger lock when not spraying. • Do not point gun at anyone or at any part of the body. • Do not put your hand over the spray tip. • Do not stop or deflect leaks with your hand, body, glove, or rag. • Follow the Pressure Relief Procedure when you stop spraying 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>EQUIPMENT MISUSE HAZARD</p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> • 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

	<p>PRESSURIZED ALUMINUM PARTS HAZARD</p> <p>Use of fluids that are incompatible with aluminum in pressurized equipment can cause serious chemical reaction and equipment rupture. Failure to follow this warning can result in death, serious injury, or property damage.</p> <ul style="list-style-type: none"> • Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents. • Do not use chlorine bleach. • Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.
	<p>TOXIC FLUID OR FUMES HAZARD</p> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled or swallowed.</p> <ul style="list-style-type: none"> • Read Safety Data Sheets (SDSs) for handling instructions and to know the specific hazards of the fluids you are using, including the effects of long-term exposure. • When spraying, servicing equipment, or when in the work area, always keep work area well-ventilated and always wear appropriate personal protective equipment. See Personal Protective Equipment warnings in this manual. • Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.
	<p>PERSONAL PROTECTIVE EQUIPMENT</p> <p>Always wear appropriate personal protective equipment and cover all skin when spraying, servicing equipment, or when in the work area. Protective equipment helps prevent serious injury, including long-term exposure; inhalation of toxic fumes, mists or vapors; allergic reaction; burns; eye injury and hearing loss. This protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> • A properly fitting respirator, which may include a supplied-air respirator, chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority. • Protective eyewear and hearing protection.

Important Acid Catalyst Information

Regulator model 26A086 is designed for acid catalysts (“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.

Acid Catalyst Conditions

									
---	---	---	---	---	---	--	--	--	--

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 acid 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 acid 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 recommendations. 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

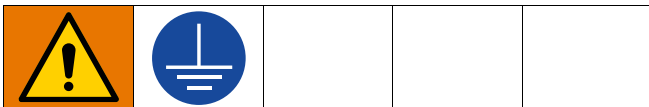
Acid catalysts can be sensitive to atmospheric moisture and other contaminants.

NOTICE

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

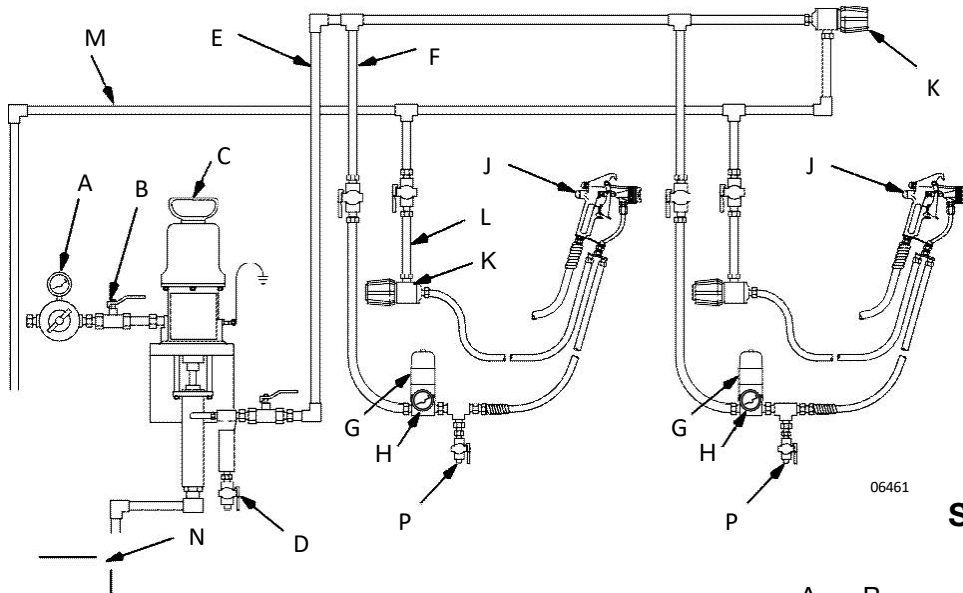
- Always use a sealed container with a desiccant dryer in the vent, or a nitrogen atmosphere. **Never** store acids in an open container.
- Use only moisture-proof hoses compatible with acids.
- Always lubricate threaded parts with an appropriate lubricant when reassembling.

Installation



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

Multiple Circulating Spray Station



Single Direct Spray Station

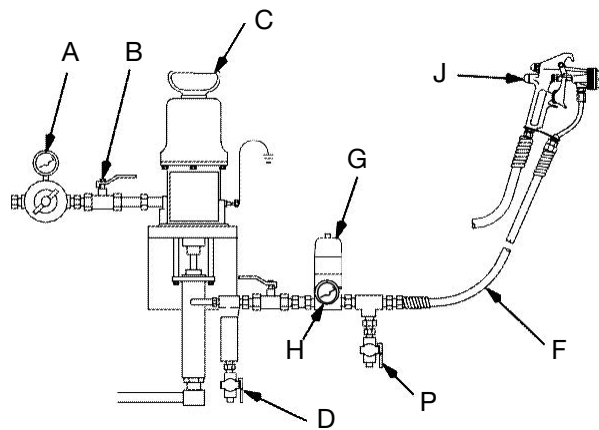


FIG. 1: Typical Installation

Key:

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

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 regulatory body.

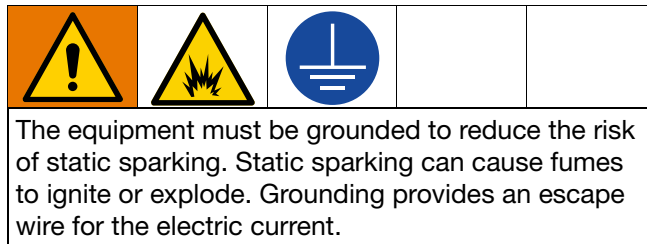
Flush the System

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.

Grounding



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.

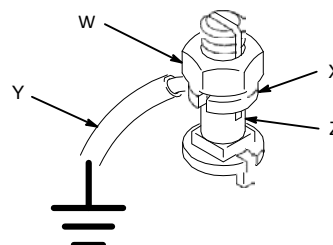


FIG. 2

0864

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 codes and regulations.

Object being sprayed: follow your local codes and regulations.

Solvent pails used when flushing: follow your local codes and regulations. 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.

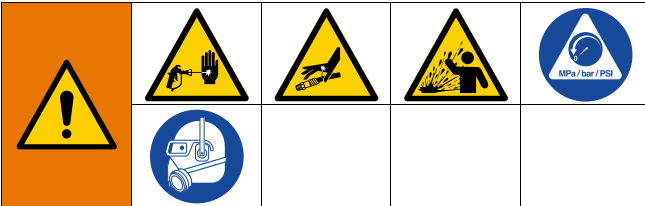
To maintain grounding continuity when flushing or relieving pressure: hold metal part of the spray gun firmly to the side of a grounded metal pail, then trigger the gun.

Operation

Pressure Relief Procedure



Follow the Pressure Relief Procedure whenever you see this symbol.



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

1. Engage trigger lock.
2. Shut off the pump by closing the bleed-type master air valve (B).
3. Disengage the trigger lock.
4. Hold a metal part of the gun firmly to a grounded metal pail. Trigger the gun to relieve pressure.
5. Engage the trigger lock.
6. Open all fluid drain valves (D and P) and back pressure valves (K) in the system, having a waste container ready to catch drainage. Leave drain valves open until you are ready to spray again.
7. If you suspect the spray tip or hose is clogged or that pressure has not been fully relieved:
 - a. VERY SLOWLY loosen the tip guard retaining nut or the hose end coupling to relieve pressure gradually.
 - b. Loosen the nut or the coupling completely.
 - c. Clear the obstruction in the hose or tip.

Adjusting the System Pressure

NOTICE

- 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 the 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.

- 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).

- In a circulating system, also adjust the back pressure valve (K).
- 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 10, 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 10. Then remove the regulator, clean it, and inspect all parts.

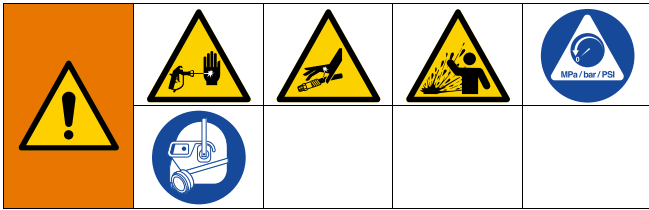
Flushing Procedure



To avoid fire and explosion, always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at the lowest possible pressure.

- 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.
- Record the pressure adjustment setting of the fluid regulator before flushing.
 - Shut off the pump and follow the **Pressure Relief Procedure** on page 10.
 - Never exceed the maximum working pressure of the lowest rated system component. Remove the gauge if the flushing pressure will exceed the gauge range.
 - Open the fluid regulator fully.
 - Spring Operated Regulators Only:* Open the fluid regulator by turning the adjusting screw (10) fully *clockwise*.
 - 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.
 - Supply solvent to the system. Set pump to the lowest possible pressure, and start pump.
 - Flush until thoroughly clean.
 - Adjust the fluid regulator to the desired setting.
 - Spring Operated Regulators Only:* Turn the adjustment screw (10) *counterclockwise* to return to the desired pressure setting.
 - Air Operated Regulator Only:* Adjust the air regulator to return to the desired fluid pressure setting.

Troubleshooting



Follow the **Pressure Relief Procedure**, page 10, before checking or repairing the equipment.

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 actuation	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 **Parts**, starting on page 16.

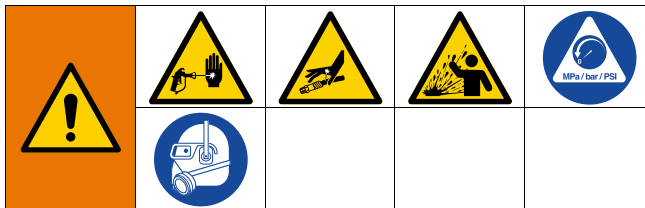
For the Cartridge Repair Kit, order Part 238748 for all models except 248090. Parts included in this kit are marked with a dagger, for example (3t), in **Parts**, starting on page 16.

For the Cartridge Repair Kit for 248090, order Part 248098. Parts included in this kit are marked with a checkmark, for example (3v), in **Parts**, starting on page 16.

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 **Parts**, starting on page 16.

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 lists in **Parts**, starting on page 16.

Prepare Equipment for Service



This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection and splashing fluid, follow the **Pressure Relief Procedure**, page 10, before servicing the equipment.

1. Follow the **Pressure Relief Procedure**, page 10.
2. Follow the **Flushing Procedure**, page 11.

Install the Air-Operated Conversion Kit

(See *Parts Drawings* on pages 14-17)

1. **Prepare Equipment for Service.** Follow steps on page 13.
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.

Replacing the Fluid Diaphragms

See Fig. 3, and follow the steps below. For parts that are not called out in Fig. 3, see **Parts**, starting on page 16.

1. **Prepare Equipment for Service.** Follow steps on page 13.
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.

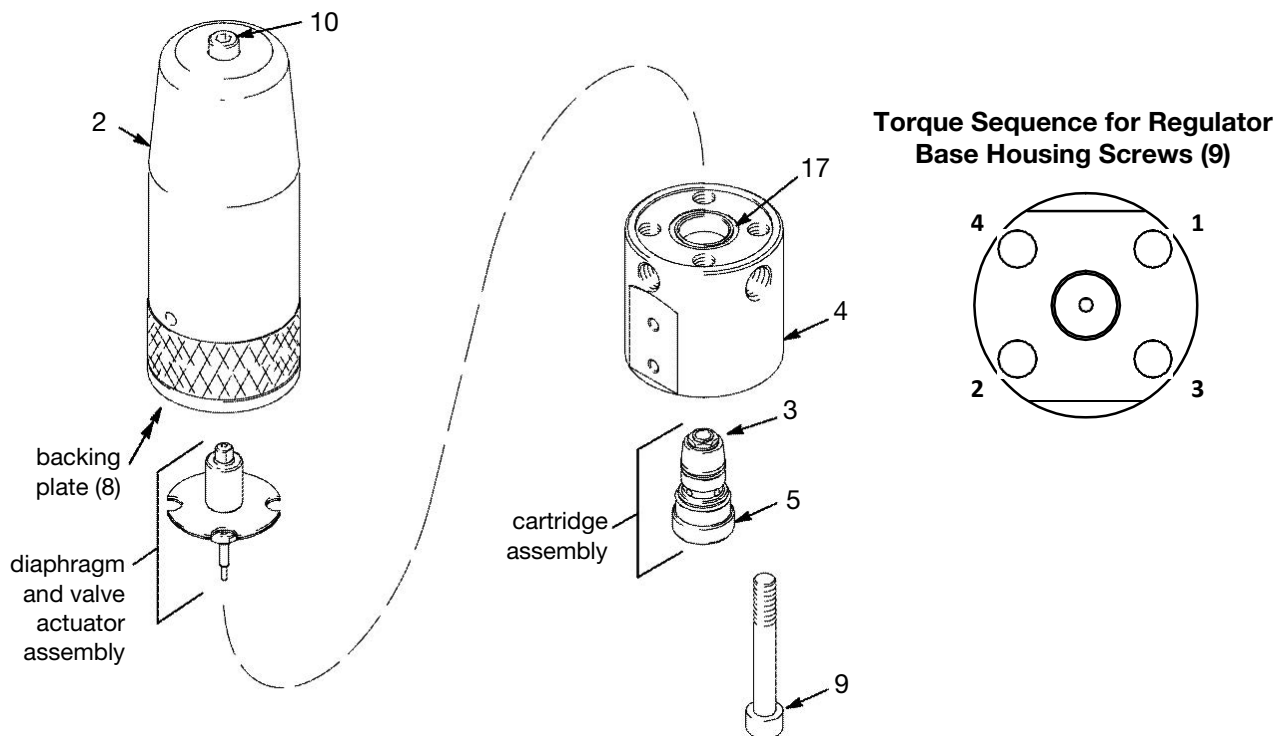


FIG. 3

06656

Replacing the Cartridge

See Fig. 3, and follow the steps below. For parts that are not called out in Fig. 3, see **Parts**, starting on page 16.

NOTICE

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

1. **Prepare Equipment for Service.** Follow steps on page 13.
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

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

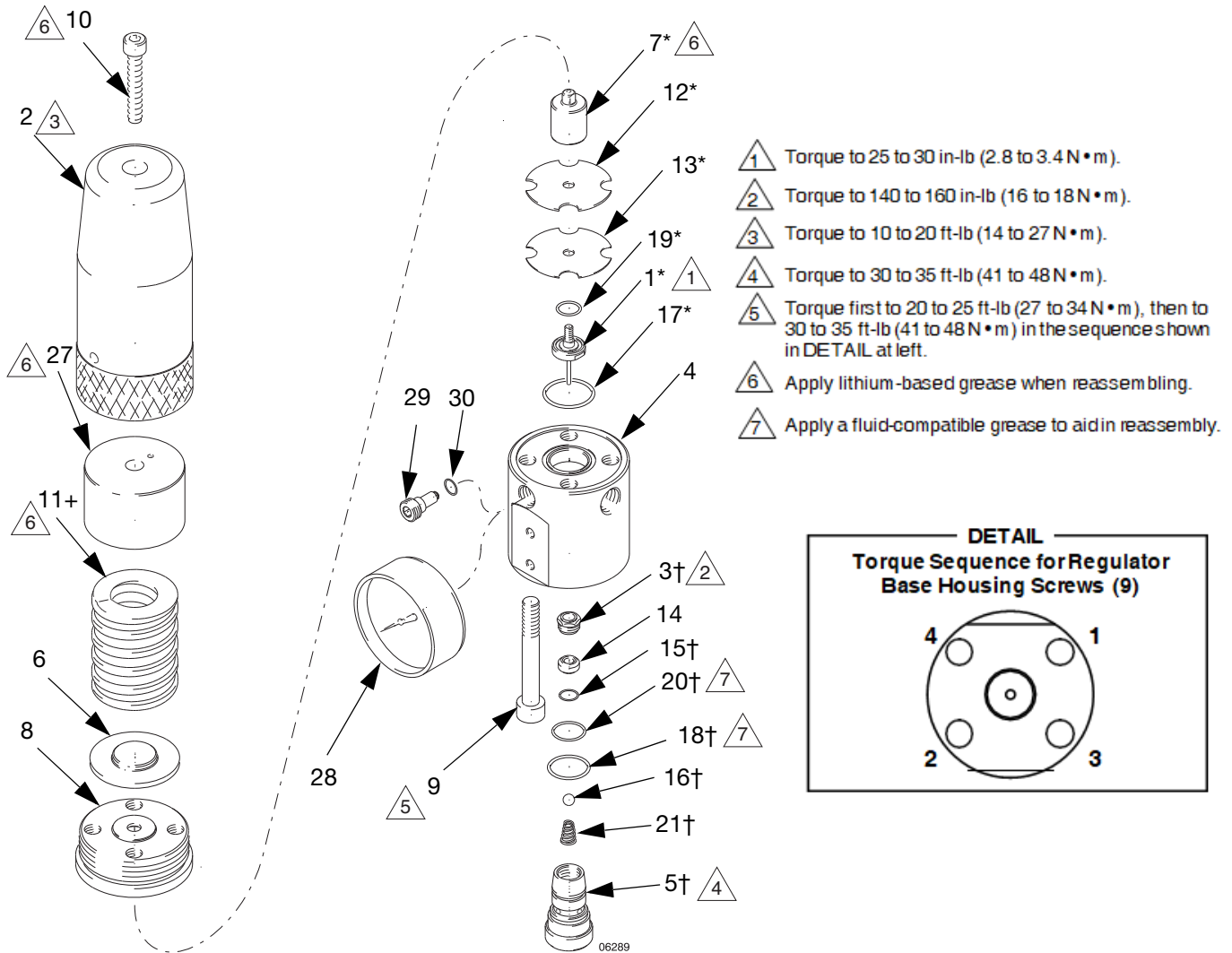
Spring-Operated Regulator

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



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

Ref.	Part	Description	Qty.
1	*	ACTUATOR	1
2	238858	COVER, spring	1
3†	191577	NUT, spring retainer	1
	17M079	NUT, spring retainer (<i>for model 26A086</i>)	1
4	191578	BASE HOUSING; sst	1
	17M080	BASE HOUSING; sst (<i>for model 26A086</i>)	1
5†	191579	VALVE HOUSING; sst	1
6	191580	RETAINER, spring, guide	1
7	*	PLUNGER, spring	1
8	191583	PLATE, backing	1
9	113623	BASE HOUSING SCREW, cap, socket-head; M10 x 1.5 x 70	4
10	113624	ADJUSTING SCREW, cap, socket-head; M8 x 1.25 x 45	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

Ref.	Part	Description	Qty.
18†	107079	O-RING, packing; PTFE 019	1
19	*	O-RING, packing; PTFE 013	1
20†	109450	O-RING, packing; PTFE 016	1
21†	111858	SPRING, compression	1
	17M078	SPRING, compression (<i>for Model 26A086</i>)	1
23	113634	WRENCH, hex; 6 mm (<i>not shown</i>)	1
27	191919	RETAINER, spring, sleeve	1
28	113641	GAUGE, pressure (<i>for Model 238890</i>)	1
	113654	GAUGE, pressure (<i>for Model 238892</i>)	1
29	238896	PLUG, EZ Flush (includes Ref. 30) (<i>for Models 238889 & 238891</i>)	1
30	107509	O-RING, packing; PTFE 007	1
31	128658	PIPE PLUG 1/4" 316 SST (<i>for Model 26A086 only</i>)	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)

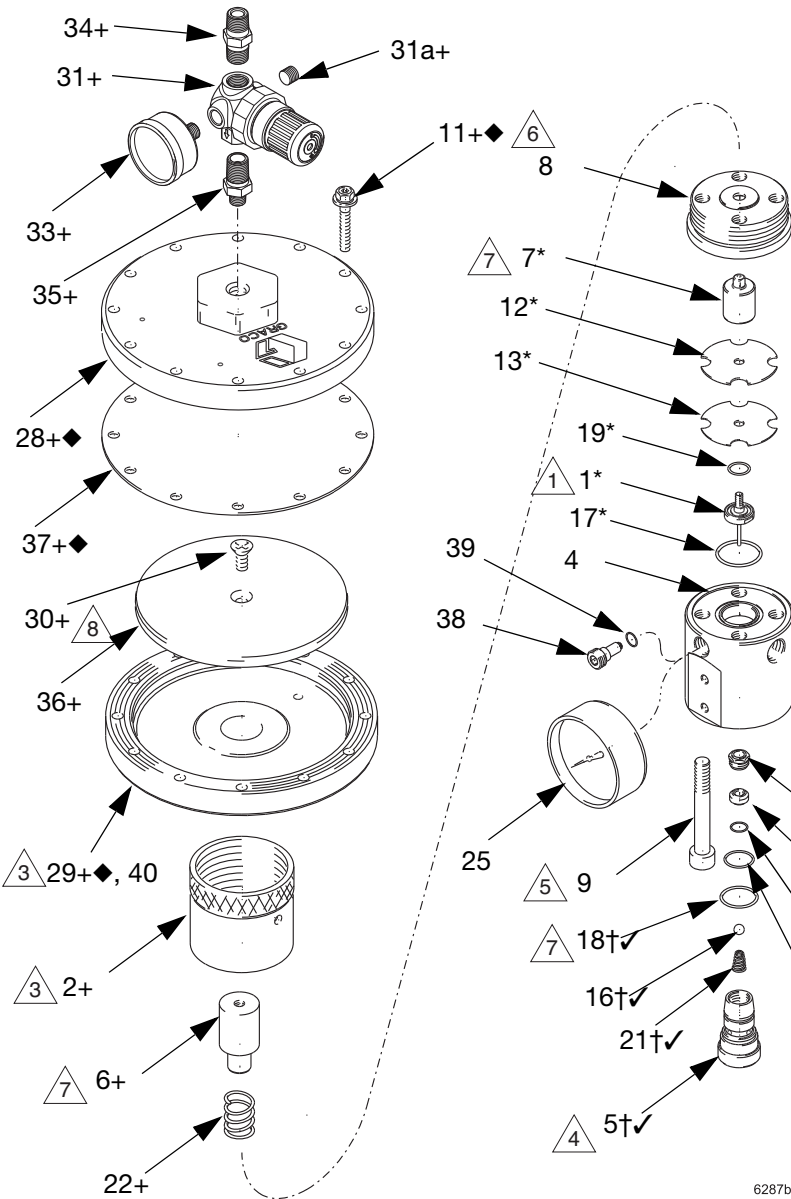
Models 238893, 238894, 248090, and 255072

238893 with EZ Flush gauge port plug
238894 with fluid pressure gauge
248090 with fluid pressure gauge for LASD material
255072 High Resolution

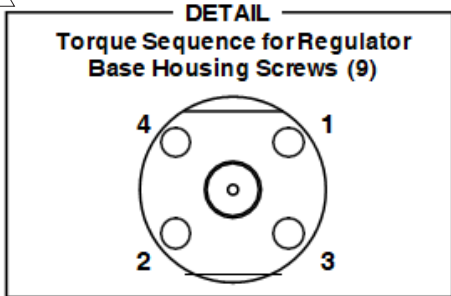
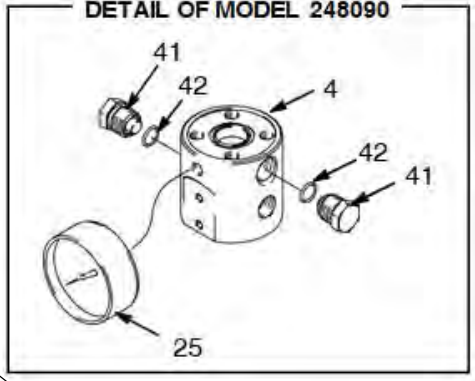
Air-Operated Regulator

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).



6287b

Models 238893, 238894, 248090, and 255072

Ref.	Part	Description	Qty.
1	*	ACTUATOR	1
2+	191584	HOUSING ADAPTER	1
3†✓	191577	NUT, spring retainer	1
4	191578	HOUSING, base (for Models 238893 and 238894)	1
	197952	HOUSING, base (for Model 248090)	1
	15J923	HOUSING, base (for Model 255072)	1
5†✓	191579	HOUSING, valve; sst	1
	15J924	HOUSING, valve (for Model 255072)	1
6	191585	ROD, piston (for Models 238893, 238894, and 248090)	1
	15J920	ROD, piston (for Model 255072)	1
7	*	PLUNGER, spring	1
8	191583	PLATE, backing	1
9	113623	BASE HOUSING SCREW, cap, socket-head; M10 x 1.5 x 70	4
11+◆	114104	SCREW, machine	12
12	*	DIAPHRAGM, regulator; PTE cream colored	1
13	*	DIAPHRAGM, regulator; PTFE white	1
14†✓	191914	SEAT, valve	1
15†✓	113651	O-RING, packing; PTFE	1
16†	112365	BALL (for Models 238893 and 238894)	1
16✓	15D092	BALL (for Models 248090 and 255072)	1
17*	109213	O-RING, packing; PTFE 025	1
18†✓	107079	O-RING, packing; PTFE 019	1
19	*	O-RING, packing; PTFE 013	1
20†✓	109450	O-RING, packing; PTFE 016	1

Ref.	Part	Description	Qty.
21†✓	111858	SPRING, compression	1
22+	160062	SPRING, stabilizing	1
25	113654	GAUGE, pressure (for Models 238894 and 248090)	1
28+◆	----	COVER, diaphragm	1
29+◆	----	HOUSING, diaphragm	1
30+	100326	SCREW, machine	1
31+	15T499	REGULATOR, air (includes Ref. 31a)	1
31a+	----	PLUG, pipe (included with Ref 31)	1
33+	108190	GAUGE, pressure, air	1
34+	156971	NIPPLE, pipe, hex	1
35+	151519	NIPPLE, reducing; 1/4 x 1/8 npt	1
36+	192194	WASHER, support	1
	15J921	WASHER (for Model 255072)	1
37+◆	180979	DIAPHRAGM; nylon (for Models 238893, 238894, and 248090)	1
38	238896	PLUG, EZ Flush (includes Ref. 39) (for Model 238893)	1
39	107509	O-RING, packing; PTFE 007 (for Model 238893)	1
40	15J922	RING, diaphragm (for Model 255072)	1
41	198241	PLUG, pressure (for Models 248090 and 255072)	2
42	111457	PACKING, o-ring; PTFE 012 (for Models 248090 and 255072)	2

* Included in Fluid Diaphragm Repair Kit 238747

† Included in Cartridge Repair Kit 238748

+ Included in Air-Operated Conversion Kit 238749

✓ Included in Cartridge Repair Kit 248098

◆ Included in Diaphragm Housing Repair Kit 16P596

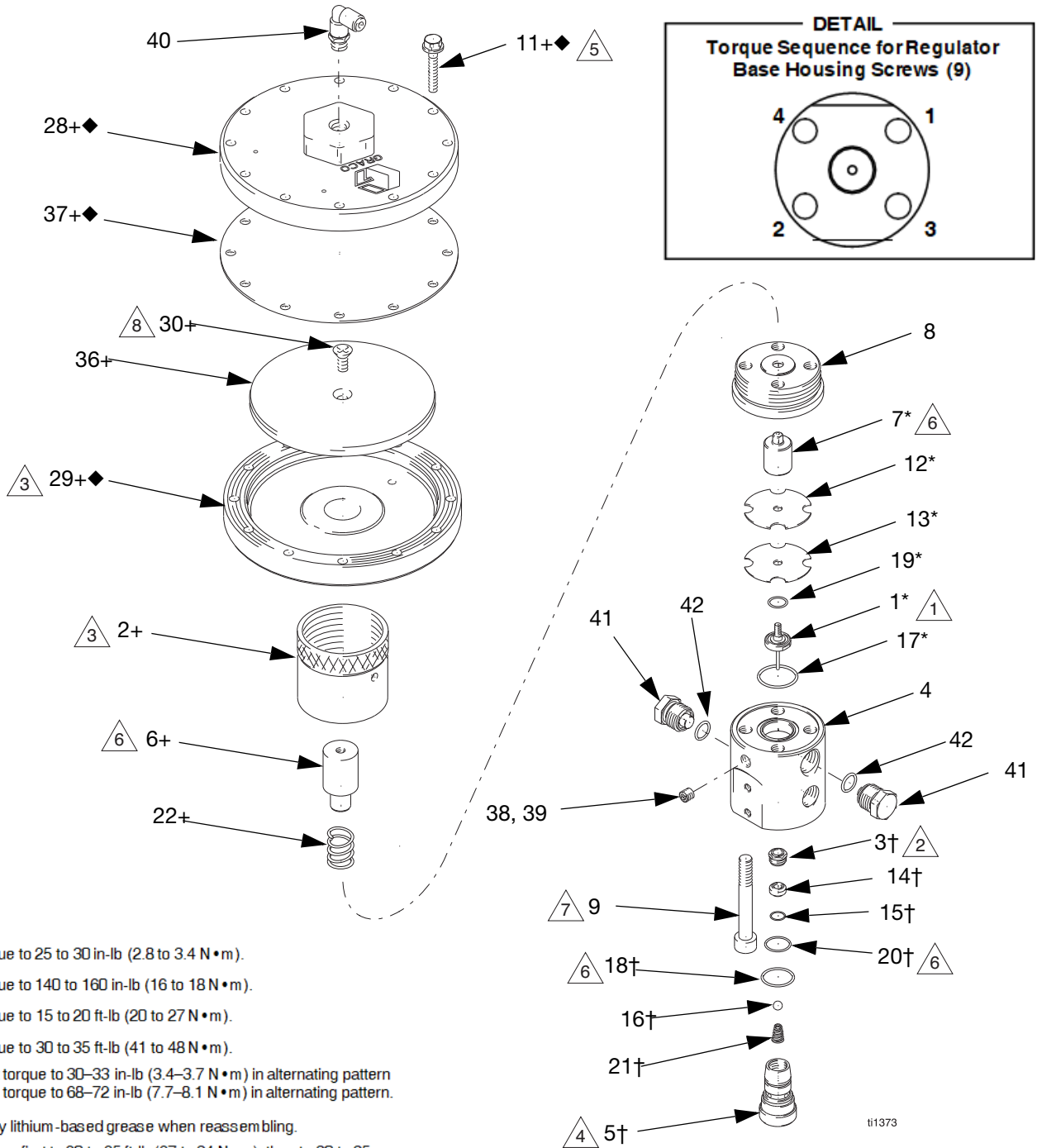
Model 244734

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).

Model 244734

Ref.	Part	Description	Qty.
1	*	ACTUATOR	1
2+	191584	HOUSING ADAPTER	1
3†	191577	NUT, spring retainer	1
4	197952	HOUSING, base	1
5†	191579	HOUSING, valve; sst	1
6+	191585	ROD, piston	1
7	*	PLUNGER, spring	1
8	191583	PLATE, backing	1
9	113623	BASE HOUSING SCREW, cap, socket-head; M10 x 1.5 x 70	4
11+◆	114104	SCREW, machine	12
12	*	DIAPHRAGM, regulator; PTE cream colored	1
13	*	DIAPHRAGM, regulator; PTFE white	1
14†	191914	SEAT, valve	1
15†	113651	O-RING, packing; PTFE	1
16†	15D092	BALL	1
17*	109213	O-RING, packing; PTFE 025	1
18†	107079	O-RING, packing; PTFE 019	1
19	*	O-RING, packing; PTFE 013	1

Ref.	Part	Description	Qty.
20†	109450	O-RING, packing; PTFE 016	1
21†	111858	SPRING, compression	1
22+	160062	SPRING, stabilizing	1
25	113654	GAUGE, pressure (for Models 238894 and 248090)	1
28+◆	----	COVER, diaphragm	1
29+◆	----	HOUSING, diaphragm	1
30+	100326	SCREW, machine	1
36+	192194	WASHER, support	1
37+◆	180979	DIAPHRAGM; nylon	1
38	238896	PLUG, EZ Flush (includes Ref. 39)	1
39	107509	O-RING, packing; PTFE 007	1
40	198171	FITTING, elbow	1
41	198241	PLUG, pressure	2
42	111457	PACKING, o-ring; PTFE 012	2

* 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 Specifications

	Model 238890 spring operated, with fluid pressure gauge Model 238889 spring operated, with EZ Flush plug Model 26A086 spring operated, with gauge port	Model 238892 spring operated, with fluid pressure gauge Model 238891 spring operated, with EZ Flush plug	Models 238894, 248090, and 255072 air operated, with fluid pressure gauge Model 238893 spring operated, with EZ Flush plug	Model 244734 spring operated, with fluid pressure gauge
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 (34-21 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 (0-21 MPa, 0-345 bar)	0-5000 psi (0-21 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	---	---

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 238893, 238894, and 248090			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

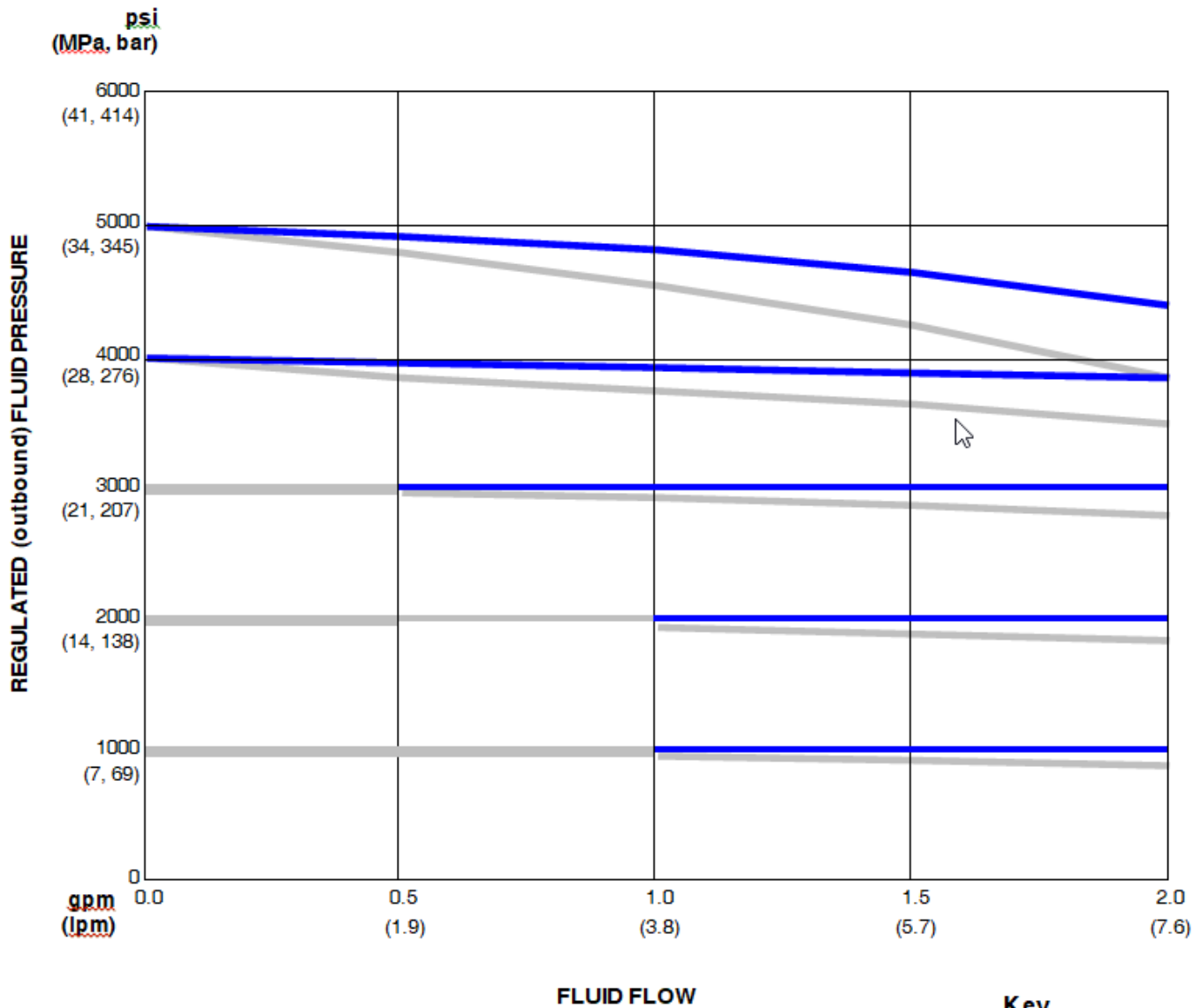
California Proposition 65

CALIFORNIA RESIDENTS

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

Performance Data

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



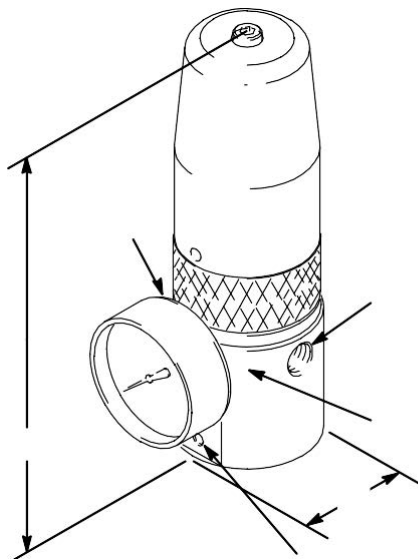
Test Conditions

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

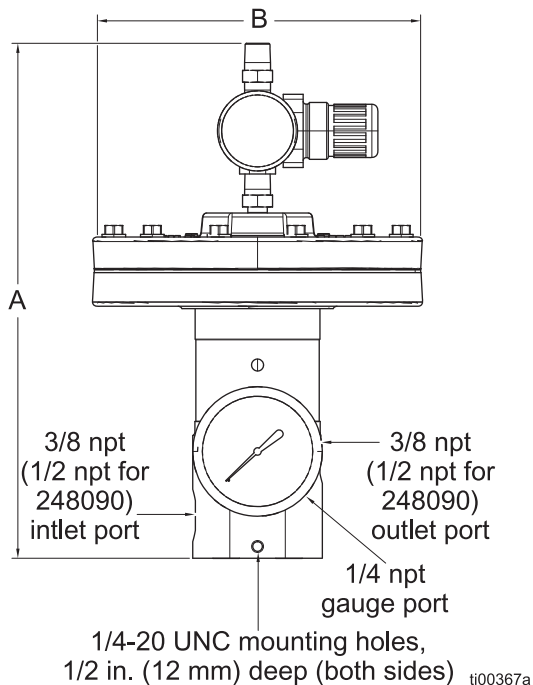


Models 238889 and 238891 with port plug
Models 238890, 238892, and 26A086 with gauge
(spring operated)

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

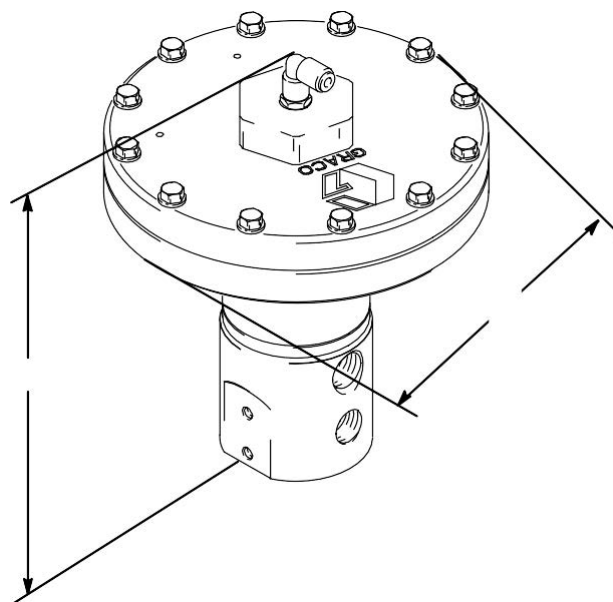
Model 238893 with port plug
Model 238890 with gauge
Models 248090 and 255072 with gauge
and 1/2 npt inlet and outlet ports
(air operated)

- 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)



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.

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

The Parties acknowledge that they have required that the present document, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English. Les parties reconnaissent avoir convenu que la rédaction du présente document sera en Anglais, ainsi que tous documents, avis et procédures judiciaires exécutés, donnés ou intentés, à la suite de ou en rapport, directement ou indirectement, avec les procédures concernées.

Graco Information

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

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

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.

Original instructions. This manual contains English. MM 308647

Graco Headquarters: Minneapolis

International Offices: Belgium, China, Japan, Korea

GRACO INC. AND SUBSIDIARIES • P.O. BOX 1441 • MINNEAPOLIS MN 55440-1441 • USA
Copyright 1997, Graco Inc. All Graco manufacturing locations are registered to ISO 9001.

www.graco.com
Revision T, October 2024