



INSTRUCTIONS

This manual contains important warnings and information.  
**READ AND RETAIN FOR REFERENCE**

120 VAC, 15 AMP

## Ultra® 1000 Airless Paint Sprayer

*3000 psi (210 bar) Maximum Working Pressure*

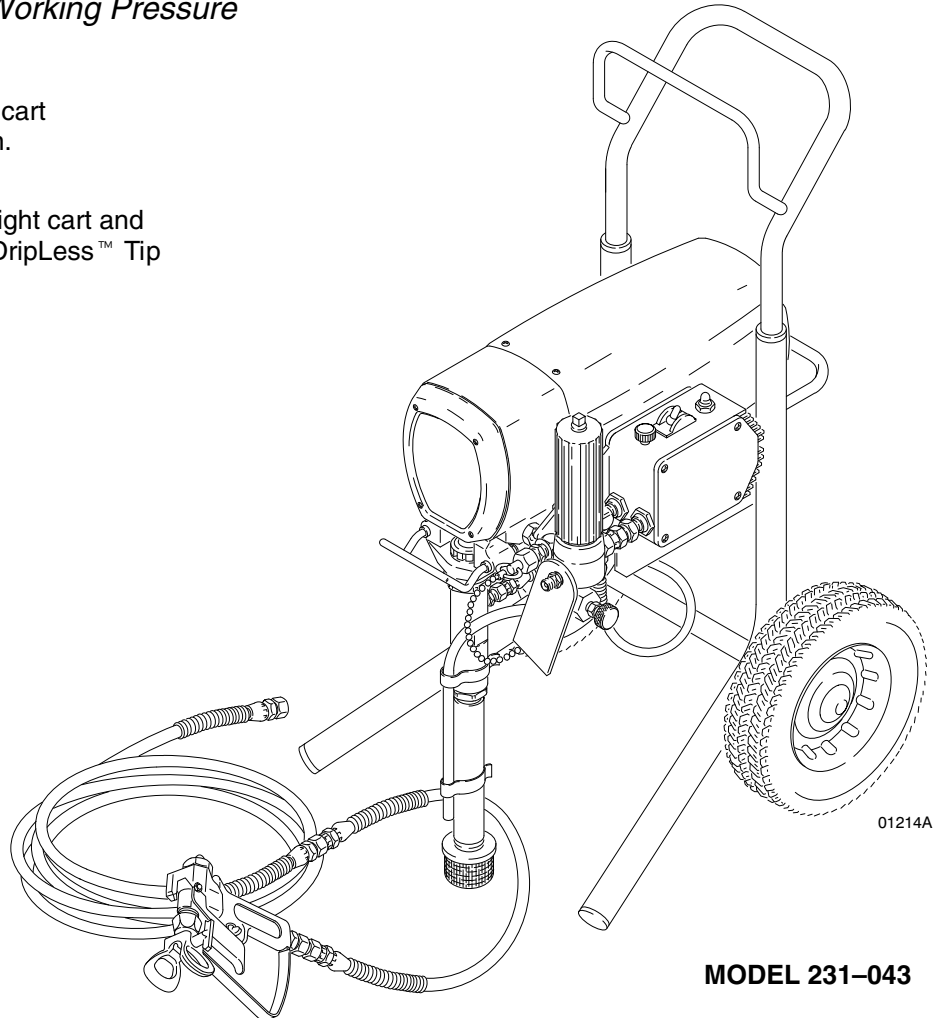
### Model 231-034, Series D

This is a basic sprayer on an upright cart and does not include a hose or a gun.

### Model 231-043, Series B

This is a complete sprayer on an upright cart and includes a hose, a gun, a RAC IV™ DripLess™ Tip Guard, and a SwitchTip™.

U.S. PATENT NO. 4,323,741; 4,397,610  
PATENTED 1983, CANADA  
AND OTHER PATENTS PENDING

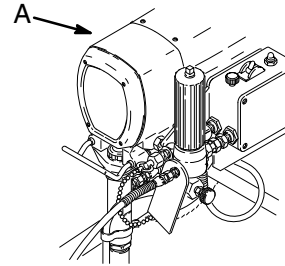


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**NOTE:** This is an example of the DANGER label on your sprayer. If you have operators who do not read the English language, order one of the labels shown to the right. Place the label on the sprayer in the location shown at A. The labels are available directly from Graco, free of charge. Call 1-800-328-0211.

**French** 185-955  
**Spanish** 185-962  
**German** 186-042  
**Greek** 186-046  
**Korean** 186-050



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<span style="float: left;">⚠</span> <span style="font-size: 2em; font-weight: bold; display: inline-block;">DANGER</span> <span style="float: right;">⚠</span>	
<b>FIRE AND EXPLOSION HAZARD</b>	<b>SKIN INJECTION HAZARD</b>
<p>Spray painting, flushing or cleaning equipment with flammable liquids in confined areas can result in fire or explosion.</p> <p>Use outdoors or in extremely well ventilated areas. Ground equipment, hoses, containers and objects being sprayed.</p> <p>Avoid all ignition sources such as static electricity from plastic drop cloths, open flames such as pilot lights, hot objects such as cigarettes, arcs from connecting or disconnecting power cords or turning light switches on and off.</p> <p>Failure to follow this warning can result in death or serious injury.</p>	<p>Liquids can be injected into the body by high pressure airless spray or leaks – especially hose leaks.</p> <p>Keep body clear of the nozzle. Never stop leaks with any part of the body. Drain all pressure before removing parts. Avoid accidental triggering of gun by always setting safety latch when not spraying. Never spray without a tip guard.</p> <p>In case of accidental skin injection, seek immediate “Surgical Treatment”.</p> <p>Failure to follow this warning can result in amputation or serious injury.</p>
<b>READ AND UNDERSTAND ALL LABELS AND INSTRUCTION MANUALS BEFORE USE</b>	

# Introduction

## Pressure Control

The pressure control includes an ON/OFF switch for the sprayer, the pressure-adjusting control knob, a pressure-sensing device and a current-overload circuit breaker with a manual-reset button. The pressure control regulates the motor speed.

## Motor

The DC motor has sealed bearings and replaceable motor brushes. The motor operates whenever there is a demand for fluid or additional fluid pressure. When the pump is cycling, the motor sounds like the cranking of an automobile starter. When the pump is not cycling, the motor hums intermittently until the fluid pressure stabilizes, then the motor will shut off. However, there is still power to the sprayer and the sprayer stays pressurized and ready to use until you manually shut it off and relieve the pressure.

The direct-current (DC) motor is less sensitive to low voltage or voltage fluctuations than an alternating-current (AC) motor. However, long extension cords may affect the sprayer performance.

## Drive Assembly

The drive assembly, which is sealed, transfers power from the DC motor to the displacement pump.

## Displacement Pump

The displacement pump provides equal fluid delivery on both the up and the down pump stroke strokes. The pump has a packing nut which, when filled with Graco Throat Seal Liquid T(SL), helps prevent damage to the throat packings and piston rod.

## Fluid Filter

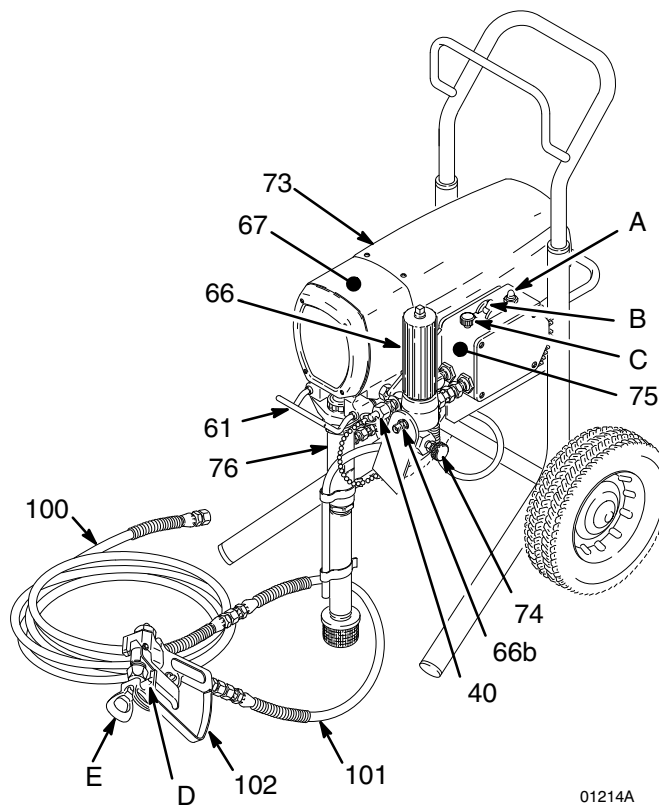
The fluid filter strains the paint to help avoid clogs in the hose and the spray tip. The filter includes a reusable element and has a pressure drain valve for manually relieving fluid pressure.

## Hoses

The grounded, nylon spray hoses have spring guards on both ends. The 50 foot (15.2 meter) hose has a 1/4 inch ID. The 3 foot (0.9 meter), 3/16 inch ID hose provides more flexible gun movement. The nylon hose material acts as a pulsation dampener to absorb pressure fluctuations.

## Spray Gun & RAC IV DripLess Tip Guard

The spray gun has a trigger safety which prevents accidental triggering when it is locked. The gun has a filter for final paint-straining. The Reverse-A-Clean IV (RAC IV) SwitchTip uses high pressure fluid to remove clogs from the spray tip without removing it from the gun. The RAC IV DripLess tip guard is a safety feature which helps reduce the risk of a skin injection injury.



## KEY

- 40 Nipple, for second hose
- 61 Pail hanger
- 66 Fluid Filter
- 66b Nipple, for the main fluid hose
- 67 Drive Assembly
- 73 Motor
- 74 Pressure drain valve
- 75 Pressure control
- 76 Displacement pump
- 100 Main fluid hose
- 101 Whip hose
- 102 Contractor gun
- A Reset button
- B On/OFF switch
- C Pressure Adjusting Knob
- D SwitchTip
- E RAC IV tip guard
- F Trigger safety shown locked

Fig. 1

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# WARNINGS

**High Pressure Spray Can Cause Serious Injury. For Professional Use Only.  
Observe All Warnings. Read and understand all instruction manuals before operating equipment.**

## FLUID INJECTION HAZARD

### General Safety

This equipment generates very high fluid pressure. Spray from the gun, leaks or ruptured components can inject fluid through your skin and into your body and cause extremely serious bodily injury, including the need for amputation. Also, fluid injected or splashed into the eyes or on the skin can cause serious damage.

Never point the spray gun at anyone or at any part of the body. Never put hand or fingers over the spray tip. Never try to “blow back” paint; this is Not an air spray system.

Always have the tip guard in place on the spray gun when spraying.

Always follow the **Pressure Relief Procedure**, below, before cleaning or removing the spray tip or servicing any system equipment.

Never try to stop or deflect leaks with your hand or body.

Be sure equipment safety devices are operating properly before each use.

### Medical Alert—Airless Spray Wounds

If any fluid appears to penetrate your skin, get **emergency medical care at once. do not treat as a simple cut.** Tell the doctor exactly what fluid was injected.

**Note to Physician:** Injection in the skin is a traumatic injury. It is important to treat the injury surgically as soon as possible. **Do not delay treatment to research toxicity.** Toxicity is a concern with some exotic coatings injected directly into the blood stream. Consultation with a plastic surgeon or reconstructive hand surgeon may be advisable.

### Spray Gun Safety Devices

Be sure all gun safety devices are operating properly before each use. Do not remove or modify any part of the gun; this can cause a malfunction and result in serious bodily injury.

### Safety Latch

Whenever you stop spraying, even for a moment, always set the gun trigger safety in the closed or “safe” position, making the gun inoperative. Failure to set the safety latch can result in accidental triggering of the gun.

### Diffuser

The gun diffuser breaks up spray and reduces the risk of fluid injection when the tip is not installed. Check diffuser operation regularly. Follow the **Pressure Relief Procedure**, below, then remove the spray tip. Aim the gun into a metal pail, holding the gun firmly to the pail. Using the lowest possible pressure, trigger the gun. If the fluid emitted *is not* diffused into an irregular stream, replace the diffuser immediately.

### Tip Guard

Always have the tip guard in place on the spray gun while spraying. The tip guard alerts you to the fluid injection hazard and helps reduce, but does not prevent, the risk of accidentally placing your fingers or any part of your body close to the spray tip.

### Trigger Guard

Always have the trigger guard in place on the gun when spraying to reduce the risk of accidentally triggering the gun if it is dropped or bumped.

### Spray Tip Safety

Use extreme caution when cleaning or changing spray tips. If the spray tip clogs while spraying, lock the gun trigger safety immediately. **ALWAYS** follow the **Pressure Relief Procedure** and then remove the spray tip to clean it.

**NEVER** wipe off build-up around the spray tip until pressure is fully relieved and the gun trigger safety is locked.

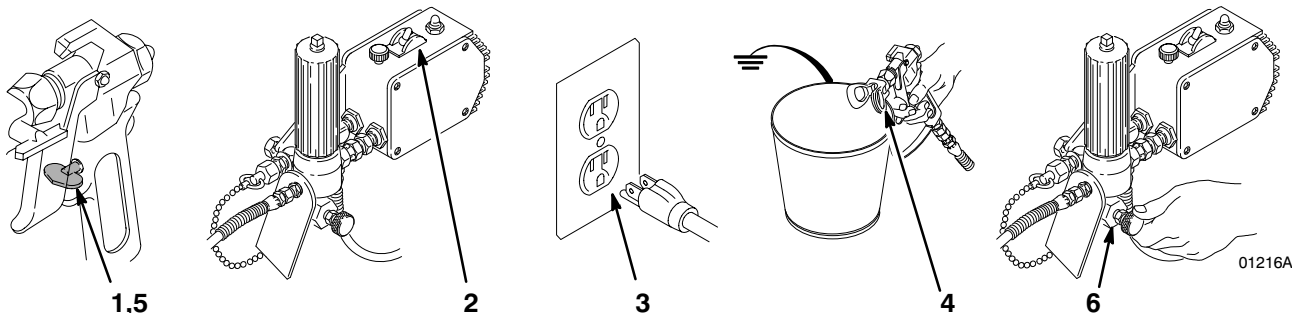
### Pressure Relief Procedure

To reduce the risk of serious bodily injury, including fluid injection, splashing fluid or solvent in the eyes or on the skin, or injury from moving parts or electric shock, always follow this procedure whenever you shut off the sprayer, when checking or servicing any part of the spray system, when installing, cleaning or changing spray tips, and whenever you stop spraying.

1. Lock the gun trigger safety.
2. Turn the ON/OFF switch to OFF.
3. Unplug the power supply cord.

4. Unlock the gun trigger safety. Hold a metal part of the gun firmly to the side of a grounded metal pail, and trigger the gun to relieve the pressure.
5. Lock the gun trigger safety.
6. Open the pressure drain valve, having a container ready to catch the drainage. Leave the valve open until you are ready to spray again.

*If you suspect that the spray tip or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, very slowly loosen the tip guard retaining nut or hose coupling to relieve the pressure gradually, then loosen completely. Now clear the tip or hose.*



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## EQUIPMENT MISUSE HAZARD

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### General Safety

Any misuse of the spray equipment or accessories, such as overpressurizing, modifying parts, using incompatible chemicals and fluids, or using worn or damaged parts, can cause them to rupture and result in fluid injection, splashing in the eyes or on the skin, or other serious bodily injury, or fire, explosion or property damage.

Never alter or modify any part of this equipment; doing so could cause it to malfunction.

Check all spray equipment regularly and repair or replace worn or damaged parts immediately.

Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.

### System Pressure

This sprayer can develop *3000 psi (210 bar) Maximum Working Pressure*. Be sure that all spray equipment and accessories used are rated to withstand this pressure. Do not exceed the maximum working pressure of any component or accessory used in the system.

### Fluid and Solvent Compatibility

All chemicals used in the sprayer must be chemically compatible with the wetted parts shown in the **Technical Data** on page 44. Consult your chemical supplier to ensure compatibility.

Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents in this equipment, which contains aluminum and/or zinc parts. Such use could result in a serious chemical reaction, with the possibility of explosion, which could cause death, serious bodily injury and/or substantial property damage.

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## HOSE SAFETY

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High pressure fluid in the hoses can be very dangerous. If the hose develops a leak, split or rupture due to any kind of wear, damage or misuse, the high pressure spray emitted from it can cause a skin injection injury or other serious bodily injury or property damage.

**All fluid hoses must have spring guards on both ends!** The spring guards help protect the hose from kinks or bends at or close to the coupling which can result in hose rupture.

Tighten all fluid connections securely before each use. High pressure fluid can dislodge a loose coupling or allow high pressure spray to be emitted from the coupling.

Never use a damaged hose. Before each use, check the entire hose for cuts, leaks, abrasion, bulging cover, or damage or movement of the hose couplings. If any of these conditions exist, replace the hose immediately. Do not try to recouple high pressure hose or mend it with tape or any other device. A repaired hose cannot contain the high pressure fluid.

Handle and route hoses carefully. Do not pull on hoses to move equipment. Keep hoses clear of moving parts and hot surfaces of the pump and gas engine. Do not use fluids or solvents which are not compatible with the inner tube and cover of the hose. Do not expose Graco hose to temperatures above 180° F (82° C) or below -40° F (-40° C).

### Hose Grounding Continuity

Proper hose grounding continuity is essential to maintaining a grounded spray system. Check the electrical resistance of your fluid hoses at least once a week. If your hose does not have a tag on it which specifies the maximum electrical resistance, contact the hose supplier or manufacturer for the maximum resistance limits. Use a resistance meter in the appropriate range for your hose to check the resistance. If the resistance exceeds the recommended limits, replace it immediately. An ungrounded or poorly grounded hose can make your system hazardous. Also read **FIRE OR EXPLOSION HAZARD**.

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## FIRE OR EXPLOSION HAZARD

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Static electricity is created by the flow of fluid through the pump and hose. If every part of the spray equipment is not properly grounded, sparking may occur, and the system may become hazardous. Sparking may also occur when plugging in or unplugging a power supply cord or using a gasoline engine. Sparks can ignite fumes from solvents and the fluid being sprayed, dust particles and other flammable substances, whether you are spraying indoors or outdoors, and can cause a fire or explosion and serious bodily injury and property damage.

If you experience any static sparking or even a slight shock while using this equipment, **stop spraying immediately**. Check the entire system for proper grounding. Do not use the system again until the problem has been identified and corrected.

### Grounding

To reduce the risk of static sparking, ground the sprayer and all other spray equipment used or located in the spray area. Check your local electrical code for detailed grounding instructions for your area and type of equipment. Be sure to ground all of this spray equipment:

1. *Sprayer*: connect a ground wire and clamp (supplied) to a true earth ground.
2. *Fluid hoses*: use only grounded hoses with a maximum of 500 ft (150 meter) combined hose length to ensure grounding continuity. See **Hose Grounding Continuity**.
3. *Spray gun*: obtain grounding through connection to a properly grounded fluid hose and sprayer.
4. *Object being sprayed*: according to local code.

5. *Fluid supply container*: according to local code.
6. *All solvent pails used when flushing*, according to local code. Use only metal pails, which are conductive. Do not place the pail on a non-conductive surface, such as paper or cardboard, which interrupts the grounding continuity.
7. *To maintain grounding continuity when flushing or relieving pressure*, always hold a metal part of the gun firmly to the side of a grounded metal pail, then trigger the gun.

### Flushing Safety

Reduce the risk of skin injection injury, static sparking, or splashing by following the flushing procedure given on page 15 of this manual. Follow the **Pressure Relief Procedure** on page 4, and remove the spray tip before flushing. Hold a metal part of the gun firmly to the side of a grounded metal pail and use the lowest possible fluid pressure during flushing.

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## MOVING PARTS HAZARD

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Moving parts can pinch or amputate your fingers or other body parts. KEEP CLEAR of moving parts when starting or operating the sprayer. Follow the **Pressure Relief Procedure** on page 4 before checking or servicing any part of the sprayer, to prevent it from starting accidentally.

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## IMPORTANT

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United States Government safety standards have been adopted under the Occupational Safety and Health Act. These standards – particularly the General Standards, Part 1910, and the Construction Standards, Part 1926 – should be consulted.

# Avertissement

**La pulvérisation à haute pression peut causer des blessures très graves.  
Réservé exclusivement à l'usage professionnel. Observer toutes les consignes de sécurité.  
Bien lire et bien comprendre tous les manuels d'instructions avant d'utiliser le matériel.**

## RISQUES D'INJECTION

### Consignes générales de sécurité

Cet appareil produit un fluide à très haute pression. Le fluide pulvérisé par le pistolet ou le fluide sous pression provenant de fuites ou de ruptures peut pénétrer sous la peau ou à l'intérieur du corps et entraîner des blessures très graves, voir même une amputation. Même sans être sous pression, le fluide éclaboussant ou entrant dans les yeux peut aussi entraîner des blessures graves.

Ne jamais pointer le pistolet vers quelqu'un ou vers une partie quelconque du corps. Ne jamais mettre la main ou les doigts sur l'ajutage du pulvérisateur. Ne jamais essayer de "refouler" la peinture. Cet appareil n'est pas un compresseur pneumatique.

Toujours garder la protection de l'ajutage en place sur le pistolet pendant la pulvérisation.

Toujours observer la **Marche à Suivre pour Détendre la Pression** donnée plus loin, avant de nettoyer ou d'enlever l'ajutage du pulvérisateur, ou d'effectuer un travail quelconque sur une partie de l'appareil.

Ne jamais essayer d'arrêter ou de dévier les fuites avec la main ou le corps.

Avant chaque utilisation, bien s'assurer que les dispositifs de sécurité fonctionnent correctement.

### Soins médicaux

En cas de pénétration de fluide sous la peau: **demandez immédiatement des soins médicaux d'urgence.** Ne pas soigner cette blessure comme une simple coupure.

**Avis au médecin:** La pénétration des fluides sous la peau est un traumatisme. **Il est important de traiter chirurgicalement cette blessure immédiatement.** Ne pas retarder le traitement pour effectuer des recherches sur la toxicité. Certains revêtements exotiques sont dangereusement toxiques quand ils sont injectés directement dans le sang. Il est souhaitable de consulter un chirurgien esthétique ou un chirurgien spécialisé dans la reconstruction des mains.

### Dispositifs de sécurité du pistolet

Avant chaque utilisation, bien s'assurer que tous les dispositifs de sécurité du pistolet fonctionnent correctement. Ne pas enlever ni modifier une partie quelconque du pistolet; ceci risquerait d'entraîner un mauvais fonctionnement et des blessures graves.

#### Verrou de sécurité

A chaque fois que l'on s'arrête de pulvériser, même s'il s'agit d'un court instant, toujours mettre le verrou de sécurité du pistolet sur la position "fermée" ou "sécurité" ("safe") pour empêcher le pistolet de fonctionner. Si le verrou de sécurité n'est pas mis, le pistolet peut se déclencher accidentellement. Voir la figure, ci-dessus.

#### Diffuser

Le diffuseur du pistolet sert à diviser le jet et à réduire les risques d'injection accidentelle quand l'ajutage n'est pas en place. Vérifier le fonctionnement du diffuseur régulièrement. Pour cette vérification, détendre la pression en observant la **Marche à Suivre pour Détendre la Pression** donnée plus loin puis enlever l'ajutage du pulvérisateur. Pointer le pistolet dans un seau en métal, en le maintenant fermement contre le seau. Puis, en utilisant la pression la plus faible possible, appuyer sur la gâchette du pistolet. Si le fluide projette *n'est pas* diffusé sous forme de jet irrégulier, remplacer immédiatement le diffuseur.

#### Protection de l'ajutage

Toujours maintenir la protection de l'ajutage en place sur le pistolet du pulvérisateur pendant la pulvérisation. La protection de l'ajutage attire l'attention sur les risques d'injection et contribue à réduire, mais n'évite pas le risque, que les doigts ou une partie quelconque du corps ne passent accidentellement à proximité immédiate de l'ajutage du pulvérisateur.

### Consignes de sécurité concernant l'ajutage du pulvérisateur

Faire extrêmement attention à l'occasion du nettoyage ou du remplacement des ajutages du pulvérisateur. Si l'ajutage se bouche pendant la pulvérisation, mettre immédiatement le verrou de sécurité du pistolet. Toujours bien observer la **Marche à Suivre pour Détendre la Pression** puis enlever l'ajutage du pulvérisateur pour le nettoyer.

Ne jamais essayer ce qui s'est accumulé autour de l'ajutage du pulvérisateur avant que la pression ne soit complètement tombée et que le verrou de sécurité du pistolet ne soit engagé.

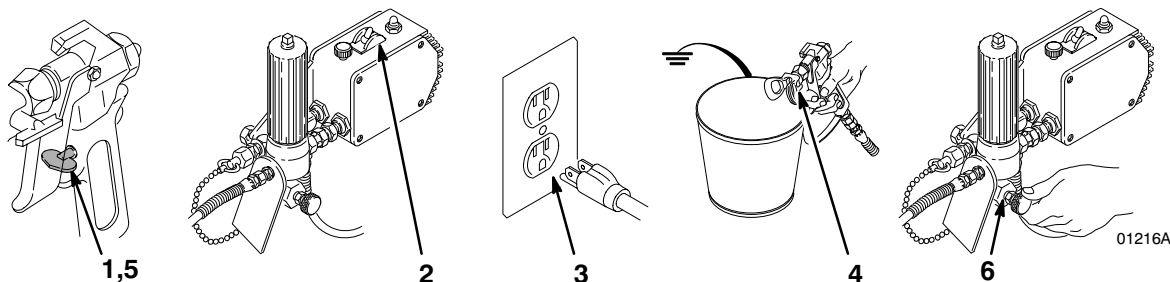
### Marche à Suivre pour Détendre la Pression

Pour réduire les risques de blessures graves, y compris les blessures par injection de fluide ou celles causées par des éclaboussures dans les yeux ou sur la peau, des pièces en mouvement ou par électrocution, toujours bien observer cette marche à suivre à chaque fois que l'on arrête le pulvérisateur, à l'occasion de la vérification, du réglage ou du nettoyage du système ou lors du changement des ajutages.

1. Engager le verrou de sécurité du pistolet.
2. Basculer l'interrupteur de commande de pression sur ARRET (OFF).
3. Débrancher le cordon d'alimentation.

4. Désengager le verrou de sécurité du pistolet. Tout en maintenant une partie métallique du pistolet fermement appuyée contre le côté d'un seau en métal, actionner le pistolet pour libérer la pression.
5. Engager le verrou de sécurité du pistolet.
6. Ouvrir la soupape de sécurité et la laisser ouverte jusqu'à ce que l'on soit prêt à se servir de nouveau du pulvérisateur. Débrancher le fil de la bougie.

*Si l'on soupçonne que le tuyau ou l'ajutage du est complètement bouché, ou que la pression n'a pas été complètement libérée après avoir procédé aux opérations ci-dessus, desserrer très lentement un raccord du bout du tuyau ou l'écrou de retenue de la protection de l'ajutage et libérer progressivement la pression.*



## RISQUES EN CAS DE MAUVAISE UTILISATION DU MATERIEL

### Consignes générales de sécurité

Toute utilisation anormale de l'appareil de pulvérisation ou des accessoires comme, par exemple, la mise sous une pression excessive, les modifications de pièces, l'utilisation de produits chimiques et de matières incompatibles et l'utilisation de pièces usées ou abîmées peut causer des dégâts à l'appareil ou des ruptures de pièces et entraîner une injection de liquide ou d'autres blessures sérieuses, un incendie, une explosion ou d'autres dégâts.

Ne jamais alterer ou modifier une pièce de cet appareil; ceci risquerait d'entraîner son mauvais fonctionnement.

Vérifier régulièrement tout l'appareil de pulvérisation et ses équipements et réparer ou remplacer immédiatement les pièces usées ou abîmées.

### Pression

Ce pulvérisateur peut produire une *Pression Maximum De Travail* 210 bar (3000 lb/po2). S'assurer que tous les éléments du pulvérisateur et ses accessoires sont conçus pour résister à la pression maximum de travail de ce pulvérisateur. Ne pas dépasser la pression maximum de travail d'aucun des éléments ou accessoires utilisés avec cet appareil.

### Compatibilité chimique des corps

Bien s'assurer que tous les corps des solvants utilisés sont chimiquement compatibles avec les parties mouillées indiquées dans les **Technical Data**, à la page 44. Toujours lire soigneusement les documents et brochures du fabricant des fluides et solvants utilisés avant de s'en servir dans ce pulvérisateur.

## MESURES DE SECURITE CONCERNANT LES TUYAUX FLEXIBLES

Le fluide à haute pression circulant dans les tuyaux peut être très dangereux. En cas de fuite sur le tuyau, de fissure, déchirure ou rupture à la suite de l'usure, de dégâts ou d'une mauvaise utilisation, les projections de fluide haute pression qui en proviennent peuvent entraîner des blessures graves par pénétration sous la peau ou par contact, ainsi que des dégâts matériels.

**Tous les tuyaux flexibles doivent avoir des ressorts spirale de protection aux bouts!** Les spirales de protection contribuent à éviter la formation de pliures, de boucles ou de nœuds sur les tuyaux qui pourraient entraîner la rupture du tuyau à l'endroit du raccord ou à son voisinage.

Serrer fermement tous les raccords avant chaque utilisation. Le fluide sous pression peut faire sauter un raccord desserré ou produire un jet à haute pression s'échappant par le raccord.

Ne jamais utiliser un tuyau endommagé. Ne pas essayer de refaire le raccord d'un tuyau haute pression ni de réparer le tuyau avec du ruban adhésif ou par tout autre moyen. Un tuyau réparé ne peut pas résister au fluide sous pression.

Manipuler les tuyaux avec précaution et choisir soigneusement leur chemin. Ne pas déplacer le fluide en tirant sur le tuyau. Ne pas utiliser de fluides ou de solvants qui ne sont pas compatibles avec l'enveloppe intérieure ou extérieure du tuyau. NE PAS exposer le tuyau à des températures supérieures à 82°C (180°F) ou inférieures à -40°C (-40°F).

### Continuité de la mise à la terre des tuyaux

Une bonne continuité de la mise à la terre des tuyaux est essentielle pour maintenir la mise à la terre de l'ensemble de vaporisation. Vérifiez la résistance électrique de vos tuyaux à fluides et à air, au moins une fois par semaine. Si votre tuyau ne comporte pas d'étiquette qui précise la résistance électrique maximum, prenez contact avec le fournisseur de tuyaux ou la fabricant pour avoir les limites de résistance maximum. Utilisez un mètre de résistance de la gamme appropriée pour votre tuyau et vérifiez la résistance. Si celle-ci dépasse les limites recommandées, remplacez le tuyau immédiatement. Un tuyau sans mise à la terre ou avec une mise à la terre incorrecte peut entraîner des risques pour votre système. Lisez aussi **LES RISQUES D'INCENDIE OU D'EXPLOSION** ci-dessus.

## RISQUES D'INCENDIE OU D'EXPLOSION

De l'électricité statique est produite par le passage du fluide à grande vitesse dans la pompe et dans les tuyaux. Si toutes les pièces de l'appareil de pulvérisation ne sont pas convenablement reliées à la masse ou à la terre, des étincelles peuvent se produire et l'appareil risque d'être dangereux. Des étincelles peuvent également se produire à l'occasion du branchement ou du débranchement du cordon d'alimentation. Les étincelles sont suffisantes pour allumer les vapeurs de solvants et le fluide pulvérisé, les fines particules de poussière ainsi que d'autres substances inflammables, quand on pulvérise à l'intérieur ou à l'extérieur, et elles peuvent causer un incendie ou une explosion, ainsi que des blessures graves et des dégâts matériels. Toujours brancher le pulvérisateur dans une prise se trouvant à au moins 6 m (20 pieds) de l'appareil et de l'endroit où se fait la pulvérisation. Ne pas brancher ou débrancher un cordon d'alimentation quel qu'il soit dans la zone où se fait la pulvérisation quand il y a le moindre risque que des vapeurs encore présentes dans l'air prennent feu.

S'il se produit des étincelles d'électricité statique, ou si vous ressentez la moindre décharge, arrêtez immédiatement la pulvérisation. Vérifiez que le système entier est bien mis à la terre. Ne vous servez pas du système avant que le problème soit identifié et corrigé.

### Mise à la terre ou à la masse

Pour réduire les risques de production d'étincelles d'électricité statique, le pulvérisateur et tous les équipements utilisés ou se trouvant dans la zone de pulvérisation doivent être reliés à la terre ou à la masse. Pour connaître le détail des instructions de mise à la terre dans la région et le type particulier d'équipement, consulter le code ou les réglementations électriques locales. S'assurer que tous les équipements de pulvérisation suivants sont bien reliés à la terre:

1. *Pulvérisateur:* Brancher le cordon d'alimentation ou la rallonge qui doivent être équipés d'une prise à 3 fiches en bon état, dans une prise de courant convenablement mise à la terre. Ne pas utiliser d'adaptateur. Toutes les rallonges doivent avoir 3 fils et être prévues pour 15 ampères.

2. *Tuyaux flexibles:* Afin d'assurer la continuité de la mise à la terre, n'utiliser que des tuyaux comportant une mise à la terre et ayant une longueur maximum combinée de 150 m (1500 pieds). Se reporter également au paragraphe **Continuité de la mise à la terre des tuyaux**.
3. *Pistolet:* Réaliser la mise à la terre en le raccordant à un tuyau flexible et à un pulvérisateur déjà convenablement reliés à la terre.
4. *Récipient d'alimentation:* observer le code ou les réglementations locales.
5. *Objets, matériel ou surfaces recevant la pulvérisation:* observer le code ou les réglementations locales.
6. *Tous les seaux de solvants* utilisés pour le rinçage: observer le code ou les réglementations locales. N'utiliser que des saux métalliques conducteurs de l'électricité. Ne pas mettre le seau sur une surface non conductrice comme sur du papier ou du carton car cela interromprait la continuité de la mise à la terre.
7. *Pour conserver la continuité de la mise à la terre quand on rince le matériel ou quand on libère la pression,* toujours maintenir une partie métallique du pistolet fermement appuyée contre le côté d'un seau en métal puis appuyer sur la détente du pistolet.

### Mesures de sécurité concernant le Rinçage

Pour réduire les risques de blessures par pénétration de la peau et les risques dus aux étincelles d'électricité statique ou aux éclaboussures, observer la marche à suivre pour le rinçage donnée à la page 15 de ce manuel. Observer la "Marche à Suivre pour Détendre la Pression" donnée à la page 6 en *enlever l'ajutage du pulvérisateur avant le rinçage*. Maintenir une partie métallique du pistolet fermement appuyée contre le côté d'un seau en métal et utiliser la pression la plus faible possible pendant le rinçage.

# ADVERTENCIA

**EL ROCIADO a ALTA PRESIÓN PUEDE CAUSAR GRAVES LESIONES. SOLO PARA USO PROFESIONAL. RESPETE LOS AVISOS DE ADVERTENCIA. Lea y entienda todo el manual de instrucciones antes de manejar el equipo.**

## PELIGRO DE INYECCION DE FLUIDO

### Seguridad general

Este equipo genera un fluido a una presión muy alta. El rociado de la pistola, los escapes de fluido o roturas de los componentes pueden inyectar fluido en la piel y el cuerpo y causar lesiones extremadamente graves, incluyendo a veces la necesidad de amputación. También, el fluido inyectado o salpicado en los ojos puede causar graves daños.

Nunca apuntar la pistola hacia alguien o alguna parte del cuerpo. Nunca colocar la mano o los dedos encima de la boquilla. Nunca tratar de "hacer retornar la pintura"; este NO es un sistema de rociado de aire.

Siempre tener colocado el protector de la boquilla en la pistola mientras se está pulverizando.

Siempre seguir el procedimiento de descarga de presión, dado más abajo, antes de limpiar o sacar la boquilla o de dar servicio a cualquier equipo del sistema.

Nunca tratar de parar o desviar los escapes con la mano o el cuerpo.

Asegurar que todos los aparatos de seguridad del equipo están funcionando bien antes de cada uso.

### Tratamiento médico

Si pareciera que un poco de fluido penetró la piel, conseguir **Tratamiento médico de urgencia de inmediato. no tratar la herida como un simple corte.** Decir al médico exactamente cual fluido fue.

**Aviso al médico:** Si se llega a inyectar este fluido en la piel se causa una lesión traumática. **Es importante tratar quirúrgicamente la lesión a la brevedad posible.** No demorar el tratamiento para investigar la toxicidad. La toxicidad es algo de suma importancia en algunas pinturas exóticas cuando se inyectan directamente al torrente sanguíneo. Sirá conveniente consultar a un especialista en cirugía plástica o reconstructiva de las manos.

### Aparatos de seguridad de la pistola pulverizadora

Asegurar que todos los aparatos protectores de la pistola están funcionando bien antes de cada uso. No sacar ni modificar ninguna pieza de la pistola pues podría causar el malfuncionamiento de la misma con las consiguientes lesiones personales.

#### Pestillo de seguridad

Cada vez que se deje de pulverizar, aunque sea por un breve momento, siempre colocar el pestillo de seguridad en la posición "cerrada" lo que deja la pistola inoperante. El no hacerlo puede llevar al disparo imprevisto de la pistola.

#### Difusor

El difusor de la pistola dispersa el chorro pulverizado y reduce el riesgo de inyección cuando no está instalada la boquilla.

Revisar con regularidad el funcionamiento del difusor. Seguir el **procedimiento de descarga de presión**, dado más abajo, y después sacar la boquilla. Apuntar la pistola a un balde metálico, sosteniéndola bien firme contra el. Utilizando la presión más bajo posible, disparar la pistola. Si el fluido emitido no sale disperso en un chorro irregular, reemplazar de inmediato el difusor.

#### Protector de la boquilla

Siempre tener el protector de la boquilla colocado en la pistola mientras se está pulverizando. Este protector llama la atención contra el peligro de inyección y ayuda a reducir, pero no evita, la colocación accidental de los dedos o cualquier otra parte del cuerpo cerca de la boquilla.

### Seguridad de la boquilla pulverizadora

Tener mucho cuidado al limpiar o cambiar las boquillas. Si llega a obstruirse mientras está pulverizando, enganchar el pestillo de la pistola de inmediato. Siempre seguir el **procedimiento de descarga de presión** y después sacar la boquilla para limpiarla.

Nunca limpiar la acumulación de pintura alrededor de la boquilla antes de que se haya descargado por completo la presión y el pestillo este enganchado.

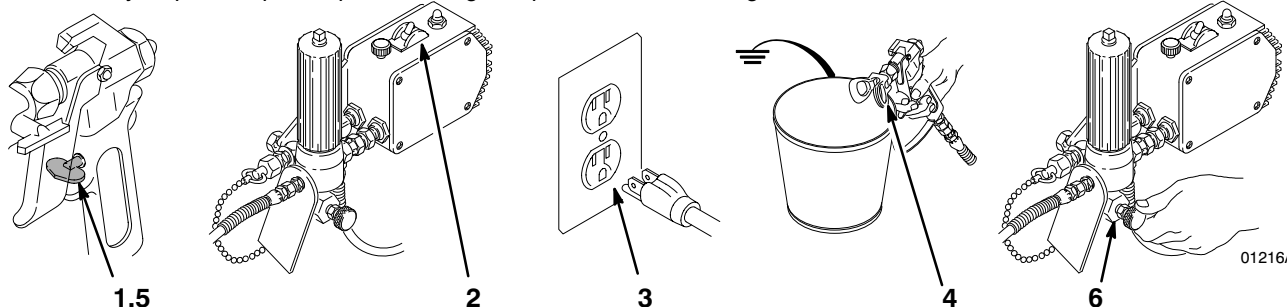
### Procedimiento de descarga de presión

Para reducir el riesgo de sufrir graves lesiones corporales, incluyendo inyección o lesiones causadas por piezas en movimiento o choque eléctrico, siempre seguir este procedimiento al apagar la máquina pulverizadora, al revisar o dar servicio a cualquier parte del sistema de pulverización, al instalar, limpiar o cambiar las boquillas, y cada vez que se deja de pulverizar.

1. Enganchar el pestillo de la pistola.
2. Mover el interruptor eléctrico (ON/OFF) a la posición OFF (apagado).
3. Desenchufar el cordón eléctrico.
4. Desenganchar el pestillo de la pistola. Sujetar una parte metálica de la pistola bien firme contra un balde de metal, y disparar la pistola para descargar la presión.

5. Enganchar el pestillo de la pistola.
6. Abrir la válvula de presión y tener listo un recipiente para recibir la pintura. Dejar la válvula de alivio de presión abierta hasta que se este nuevamente listo para pulverizar.

Si se sospecha que la boquilla o la manguera está completamente obstruida, o que no se ha descargado por completo la presión después de haber seguido el procedimiento anterior, aflojar muy lentamente la tuerca de retención del protector de la boquilla o acoplamiento de la punta de la manguera y descargar gradualmente la presión, después, aflojarlo por completo. Luego, despejar la boquilla o la manguera.





## PELIGRO POR MAL USO DEL EQUIPO

### Seguridad general

Cualquier mal uso del equipo pulverizador o los accesorios, tal como sobre presurización, modificación de piezas, uso de materiales y productos químicos incompatibles, o utilización de piezas dañadas o desgastadas, puede hacer que se rompan y causen la inyección de fluido u otras lesiones corporales graves, incendio, explosión o daño a la propiedad.

Nunca alterar o modificar ninguna pieza de este equipo; el hacerlo podría causar una avería.

Revisar con regularidad el equipo pulverizador y reparar o reemplazar de inmediato las piezas dañadas o desgastadas.

### Presión del sistema

está pulverizadora puede desarrollar 210 barías (3000 psi) *De Presión De Trabajo Máxima*. Asegurar que todo el equipo pulverizador y sus accesorios tienen la capacidad para aguantar la presión máxima de trabajo de esta pulverizadora. NO exceder la presión máxima de trabajo de ningún componente o accesorio de este sistema.

### Compatibilidad de fluido

Siempre leer las instrucciones del fabricante del fluido y solvente antes de usarlos en esta pulverizadora, dadas en la página 44.

Siempre usar gafas, guantes, vestimentas protectora y un respiradero, tal como recomiendan los fabricantes del fluido y del solvente.

## SEGURIDAD EN EL USO DE LAS MANGUERAS

El fluido que escapa a alta presión por las mangueras puede ser muy peligroso. Si en la manguera se desarrolla un escape, una rotura o rajadura debido a cualquier tipo de desgaste, daño o maltrato, el chorro a alta presión emitido por allí puede causar una lesión por inyección u otras lesiones corporales graves o daños a la propiedad.

**!Todas Las Mangueras Para Fluidos Tienen Que Tener Guardas De Resorte En Ambos Extremos!** Estas protegen las mangueras contra dobleces o retorceduras en los acoplamientos o cerca de ellos, los que podrían traducirse en roturas de la manguera.

Antes de usarlas, apretar bien firmes todas las conexiones. El fluido a alta presión puede desalojar un acoplamiento suelto o dejar que por el escape un chorro a alta presión.

Nunca usar una manguera que está dañada. Siempre, revisarla en busca de cortaduras, escapes, abrasión, cubierta abultada, o acoplamientos sueltos o dañados. Si llegara a encontrarse cualquiera de estas condiciones, reemplazar de inmediato la manguera. NO intentar racoplar una manguera de alta presión o enmendarla con cinta adhesiva u otro material similar. Una manguera que ha sido remendada no aguantará el fluido a alta presión.

Manejar y pasar cuidadosamente las mangueras. No tirar de las mangueras para mover el equipo. No usar fluidos o solventes que sean incompatibles con el tubo interno y la cubierta de la manguera. No exponer las mangueras a temperaturas sobre 82°C (180°F) o bajo -40°C (-40°F).

### Continuidad del circuito de puesta a tierra de la manguera

La continuidad del circuito de puesta a tierra apropiado es esencial para mantener conectado a tierra el sistema pulverizador. Es indispensable revisar la resistencia eléctrica máxima de las mangueras de aire y de fluido por lo menos una vez a la semana. Si la manguera no tiene una etiqueta en la cual se especifica la resistencia eléctrica, ponerse en contacto con el proveedor o fabricante de la manguera para la información sobre los límites de resistencia. Usar un metro de resistencia en la gama apropiada para comprobar la resistencia; si excede los límites recomendados, reemplazarla de inmediato. Es muy arriesgado tener una manguera sin puesta a tierra o con la puesta a tierra en malas condiciones. Leer también la información sobre **RIESGO DE INCENDIO O EXPLOSION**, más arriba.

## PELIGRO DE INCENDIO O EXPLOSION

El flujo a alta velocidad del fluido al pasar por la bomba y manguera crea electricidad estática. Si todas las partes del equipo pulverizador no tienen buena tierra, pueden ocurrir chispas, convirtiendo al sistema en algo peligroso. También, pueden producirse chispas al enchufar o desenchufar el cordón eléctrico o al usar un motor de gasolina. Estas chispas pueden inflamar los vapores de los solventes y el chorro de fluido pulverizado, partículas de polvo y otras sustancias inflamables, sea al aire libre o bajo techo, lo que podría causar una explosión o incendio y graves lesiones corporales y daños a la propiedad. Enchufar siempre la pulverizadora a un tomacorriente que se encuentre a por lo menos 6 m (20 pies) de la máquina y del área que se va a rociar. No enchufar o desenchufar ningún cordón eléctrico en el lugar donde se está rociando cuando todavía exista la posibilidad de que queden vapores inflamables en el aire.

Si ocurre una chispa de electricidad estática o incluso un ligero choque eléctrico mientras se usa el equipo, dejar de pulverizar de inmediato. Revisar todo el sistema en busca de una tierra apropiada. No usar de nuevo el sistema hasta haber identificado y solucionado el problema.

### Peusta a tierra

Para reducir el riesgo de chispas estáticas, conectar a tierra la pulverizadora y todo el otro equipo de pulverizar que se use o se encuentre en el lugar que se va a rociar. Consultar el código eléctrico de la localidad para las instrucciones sobre las conexiones a tierra exigidas para la zona y tipo de equipo. Asegurar de conectar a tierra todo este equipo pulverizador:

1. *Pulverizadora:* enchufar el cordón eléctrico, o cable extensor, cada uno en un enchuf de tres patas en buen estado, a un tomacorriente con puesta a tierra apropiada. No usar un adaptador. Todos los cables extensores tienen que tener tres hilos y una capacidad de 15 amperios.

2. *Mangueras para fluidos:* usar solamente mangueras con puesta a tierra de una longitud combinada de 150 m (500 pies), para asegurar buena continuidad a tierra. Referirse también al párrafo sobre **continuidad del circuito de puesta a tierra de la manguera**.
3. *Pistola:* hacer la puesta a tierra conectándola a una manguera de fluido y pulverizadora bien conectadas a tierra.
4. *Suministrar un recipiente:* de acuerdo al código de la localidad.
5. *Objeto que se está rociando:* de conformidad con el código local.
6. *Todos los baldes de solvente* usados durante el lavado, de conformidad con el código local. Usar *solamente baldes de metal*, que sean conductivos. No colocar el balde en una superficie no conductiva, como papel o cartón, que interumpe la continuidad a tierra.
7. *Para mantener la continuidad a tierra durante el lavado o descarga de presión*, siempre apoyar una parte metálica de la pistola bien firme contra el costado del *balde de metal*, después apretar el gatillo.

### Seguridad durante el lavado

Para reducir el riesgo de que se inyecte o salpique fluido en la piel, o que ocurra una descarga de electricidad estática, siempre seguir las **INSTRUCCIONES PARA EL LAVADO**, dadas en la página 15. Seguir el **procedimiento de descarga de presión** en la página 8, y quitar la *boquilla rociadora antes de lavar*. Apoyar una parte metálica de la pistola bien firme contra el costado de un *balde de metal* y usar la presión más baja posible de fluido durante el lavado.

# Setup

## WARNING

Follow these precautions to reduce the risk of a serious injury from static sparking, fluid injection, or rupturing the hose or the gun

- All hoses must be electrically conductive.
- The gun must have a tip guard.
- Each part must be rated for at least 3000 psi (210 bar) Maximum Working Pressure.

## CAUTION

To avoid damaging the pressure control, which may result in poor equipment performance and component damage, follow these precautions:

- Always use grounded, flexible spray hose at least 50 feet (25 meter) long.
- Never use a wire braid hose as it is too rigid to act as a pulsation dampener.
- Never install any shutoff device between the filter (66) and the main hose (100). See Fig. 2.
- Always use the main filter–outlet for one gun operation. Never plug this outlet.

## WARNING

Proper electrical grounding is essential to reduce the risk of a fire or a explosion. A fire or explosion can cause a serious injury and property damage. Read the warning section, **FIRE OR EXPLOSION HAZARD**, on page 5 for more detailed grounding instructions.

**NOTE:** Refer to Fig. 2 while following this procedure.

1. Fill the packing nut until it is 1/3 full with Graco Throat Seal Liquid (TSL).
2. Connect the gun, the 3 foot (0.9 meter) hose and the 50 foot (25.2 meter) hose. Screw the assembly onto the outlet nipple. Don't use thread sealant and don't install the spray tip yet!
3. Follow this step to connect a second hose and gun. Unscrew the cap (72) from the optional outlet. Use a hose and a gun which are equivalent to the hoses supplied with the sprayer. Assemble the hoses and the gun, and then connect the hose to the optional outlet.
4. Check the electrical service.
  - a. The electrical requirements are 120 volt, 60 Hz AC, 15 Amp (minimum).
  - b. Use a grounded electrical outlet which is located at least 20 feet (6 meter) from the spray area.
  - c. Do not remove the grounding prong of the power cord and do not use an adapter.
  - d. The specifications for the extension cord are 15 amps, 3 wires, grounding–type. Long extension cords affect the sprayer performance.

# Setup

5. Plug in the sprayer. Turn off the switch (B). Plug the power cord into a grounded electrical outlet.
6. Flush the pump to remove the oil which was left in the pump to protect it during shipment. Follow the flushing procedure on page 15.
7. Prepare the paint according to the manufacturer's recommendations. Remove the skin which may have formed on top of the paint. Stir the paint thoroughly. Strain the paint through a fine, nylon, mesh bag to remove particles that could clog the filter or the spray tip.

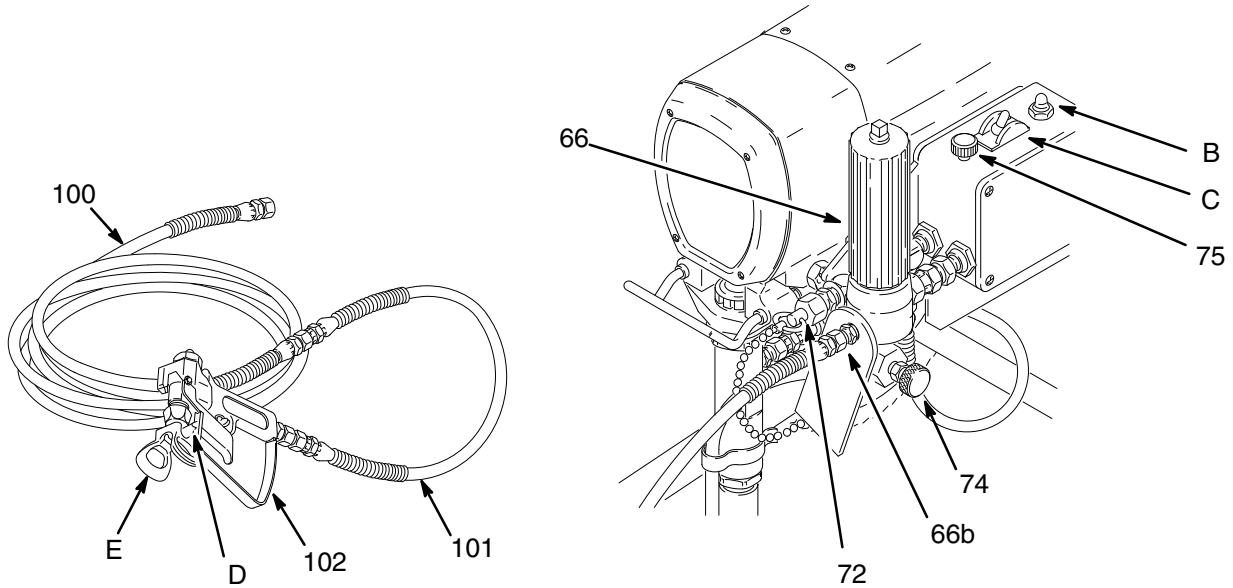


Fig. 2

01217A

# Operation

Use this procedure each time you start the sprayer to help ensure that the sprayer is ready to operate and that you start it safely.

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

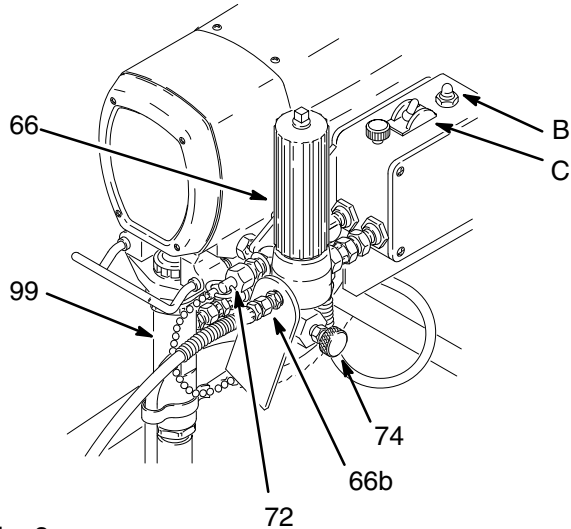


Fig. 3 01217A

**NOTE:** Flush the sprayer if this is a first-time startup. See page 15.

**NOTE:** See Fig. 3 except where noted.

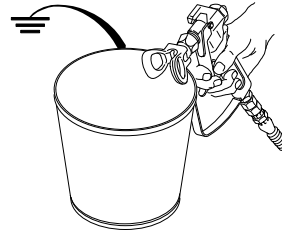
1. Plug in the sprayer.
2. Close the pressure drain valve (74). If you did not install a second hose, be sure the nipple (40) is tightly plugged with the cap (72).
3. Put the suction tube into the paint container.
4. Turn the pressure-adjusting knob (C) fully counter-clockwise to the minimum pressure.

## CAUTION

Do not operate the pump without fluid in it for more than 30 seconds, to avoid damage to the pump packings.

## WARNING

To reduce the risk of static sparking and splashing when flushing, always remove the spray tip from the gun and hold a metal part of the gun firmly to the side of a grounded metal pail.



0143

5. Prime the pump.
  - a. Open the pressure drain valve. Turn on the sprayer. Slowly turn the pressure-adjusting knob clockwise until the sprayer starts. When the fluid comes from the drain hose, close the valve.
  - b. Unlock the gun trigger safety. See reference A in Fig. 4. Follow the warning, above, and trigger the gun until all air is forced out of the system and the fluid flows freely from the gun.
  - c. Release the trigger. Lock the gun trigger safety. See reference B in Fig. 4.

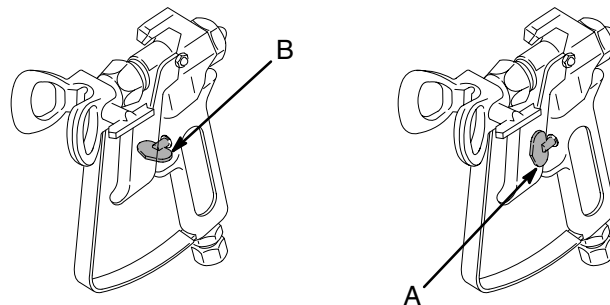


Fig. 4 0137

# Operation

6. Check all fluid connections for leaks. Relieve the fluid pressure before tightening connections.
7. Install the spray tip and tip guard. Lock the gun trigger safety. Install the spray tip according to the instructions supplied with it.
8. Adjust the spray pattern.
  - a. Increase the pressure just until the spray from the gun is completely atomized. Use the lowest pressure needed to get the desired results. This procedure reduces over-spray and fogging, decreases the spray tip wear, and extends the life of the sprayer.
  - b. If more coverage is needed, use a larger tip rather than increasing the pressure.
  - c. Test the spray pattern. To adjust the pattern, lock the gun trigger safety, loosen the retaining nut. Position the tip guard horizontally for a horizontal pattern or vertically for a vertical pattern. Tighten the retaining nut.

# Maintenance

## Cleaning a Clogged Tip

### WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

### WARNING

To reduce the risk of a serious injury from accidentally injecting fluid into the skin, follow these precautions.

- Never operate the spray gun with the tip guard removed.
- Do not hold your hand, body, or a rag in front of the spray tip when cleaning or checking a clogged tip. Always point the gun toward the ground or into a pail when checking to see if the tip is clear.
- Do not try to “blow back” paint; this is not an air sprayer.

1. Clean the front of the tip frequently. First, relieve the pressure.

2. If the spray tip clogs, release the gun trigger, lock the gun trigger safety, and rotate the handle (A) of the RAC IV by 180°. See Fig. 5, which shows the handle in the spraying position and the gun trigger safety (B) in the locked position.
3. Unlock the gun trigger safety. Trigger the gun into a waste container. Lock the gun trigger safety again.
4. Return the handle to the original position, unlock the gun trigger safety, and resume spraying.
5. If the tip is still clogged, lock the gun trigger safety, shut off and unplug the sprayer, and open the pressure drain valve. Clean the spray tip as shown in manual 307–848.

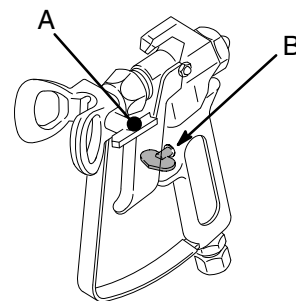


Fig. 5

0137

# Shutdown and Care of the Sprayer

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

1. Check the packing nut (216) daily. Relieve the pressure. Keep the packing nut 1/3 full of TSL at all times to help prevent fluid buildup on the piston rod and the premature wear of the packings.

Tighten the packing nut (216), in the direction shown by the bold arrow, just enough to stop leakage. Do not over-tightening the packing nut which may cause it to binding and may cause the packings to wear prematurely. Use a round punch or a brass rod and a lightweight hammer to adjust the nut. See Fig. 6.

2. Clean the fluid filter (66) at least once a day. Follow the flushing procedure on page 15 or refer to manual 307-273, for the cleaning procedure.
3. Lubricate the bearing housing (69) after each 100 hours of operation. Relieve the pressure. Remove the front cover (49). Fill the cavity in the bearing housing with SAE 10, non-detergent oil. See Fig. 6.
4. For very short shutoff periods, leave the suction tube in the paint, relieve the pressure, and clean the spray tip.
5. Flush the sprayer at the end of each work day. The final flush should be mineral spirits. See page 15.

## CAUTION

To prevent serious damage to the pump, which can result in poor sprayer performance and costly repairs, follow these precautions.

- Do not allow water or any type of paint to freeze in the sprayer or the pressure control.
- Always flush with a compatible solvent and then flush again with mineral spirits when you are done spraying.

6. Coil the hose and hang the hose on the hose rack when storing the sprayer, even for overnight.

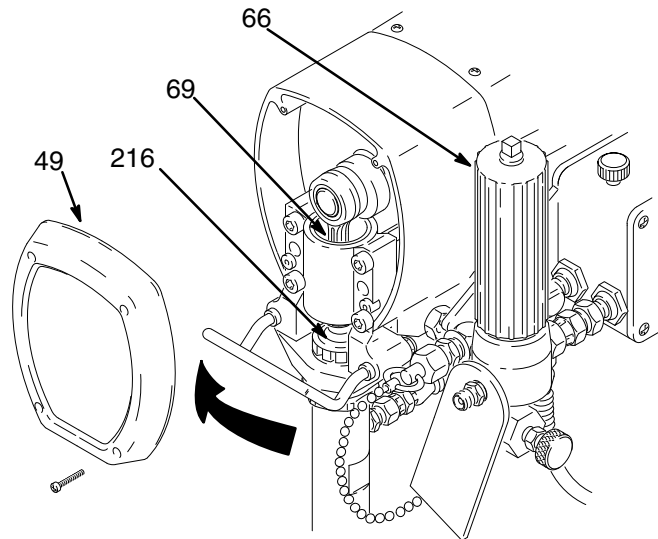


Fig. 6

04430

# Flushing

**NOTE:** Use this chart to determine the required order for flushing the sprayer.

\*Use this category for flushing a brand new sprayer and flushing after storage.

System has this fluid in it:	Next fluid to be sprayed.	Flushing order:			Follow this step before you use or store the sprayer.
		Flush 1	Flush 2	Flush 3	
*Oil-based solvent or paint	Oil-based paint – new color	Use mineral spirits.	none	none	Prime the sprayer with oil-based paint.
Oil-based solvent or paint	Water-based paint	Use mineral spirits.	Use warm soapy water.	Use clean water.	Prime the sprayer with water-based paint.
Oil-based solvent or paint	Prepare the sprayer for storage	Use mineral spirits.	none	none	Relieve the pressure. Leave drain valve open.
Water or water-based paint	Water-based paint – new color	Use warm soapy water.	Use clean water.	none	Prime the sprayer with water.
Water or water-based paint	Oil-based paint	Use warm soapy water.	Use clean water.	Use mineral spirits.	Prime the sprayer with oil.
Water or water-based paint	Prepare the sprayer for storage	Use warm soapy water.	Use clean water.	Use mineral spirits.	Relieve the pressure. Leave drain valve open.

## CAUTION

Never allow water to freeze in the pressure control. If water freezes in the pressure control, it may be seriously damaged and the sprayer may not start. Always pump the water out with mineral spirits before the water could freeze in the pressure control.

## WARNING

To reduce the risk of static sparking and splashing when flushing, always remove the spray tip from the gun and hold a metal part of the gun firmly to the side of a grounded metal pail.

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

1. Relieve the pressure.
2. Turn the pressure-adjusting knob (A) fully counter-clockwise to the minimum pressure.
3. Remove the spray tip from the gun. Remove the filter bowl (B) and the screen (C), but leave the support (D) in place. Install the bowl without the screen. See Fig. 7.

4. Put the suction tube into a grounded metal-pail with 1/2 gallon (2 liters) of a compatible solvent.
5. Start the sprayer. See page 12. To save the fluid still in the sprayer, trigger the gun into another container until the next fluid appears, then trigger the gun back into the fluid you are pumping. Circulate the flushing fluid for a few of minutes to thoroughly clean the system.
6. Do not run the pump dry for more than 30 seconds to avoid damaging the pump packings!
7. Relieve the pressure. Lock the gun trigger safety.
8. Unscrew the filter bowl (B) and reinstall the clean screen (C). Install the bowl and hand tighten it.

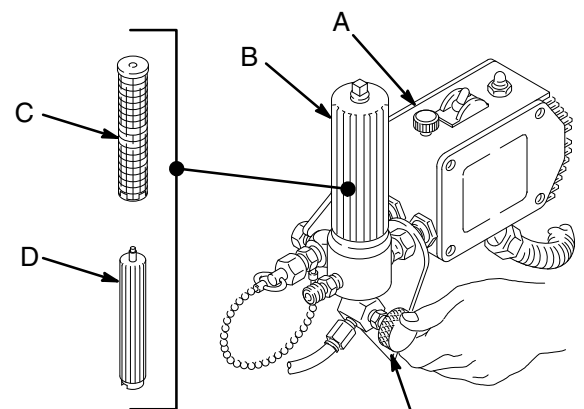


Fig. 7

74

01220

# Troubleshooting

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

Check everything in the charts before disassembling the sprayer.

## 1 The sprayer will not operate.

PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
Check these basic fluid pressure problems.	1.. Check the pressure setting. The motor will not operate if the pressure is at the minimum setting (fully counterclockwise).	1. Slowly increase the pressure setting to see if the motor starts.
	2. Check for a clogged spray tip. Refer to the separate gun or tip instruction manual.	2. Relieve the pressure. Refer to the separate gun or tip instruction manual for tip cleaning.
Check these basic mechanical problems.	1. Check for frozen or hardened paint in the pump (76) and/or the pressure control tube. Use a screwdriver to manually rotate the fan at the back of the motor. See page 22.	1. Thaw the pump. Plug in the sprayer and turn on the sprayer. Slowly increase pressure to see if the motor starts. If the motor doesn't start, see NOTE 1, below.
	2. Check the pump's connecting rod pin (43). The pin must be completely pushed into the connecting rod (68), and the retaining spring (42) must be firmly in groove of connecting rod. See Fig. 29, page 36.	2. Push the pin into place and secure it with the spring retainer.
	3. Check for damage to the motor. Remove the drive housing (67). See page 33. Try to manually rotate the fan.	3. Replace the motor (73) if the fan won't turn. See page 34 .
Check these basic electrical problems.	1. Check the sprayer's circuit breaker (309) button to be sure it has not popped up.	1. Depress the button to reset. If the circuit breaker continues to open, see the section "There is an electrical short." on page 21.
	2. Check the electrical supply with a volt meter. The meter should read 105 to 125 VAC.	2. Reset the building circuit breaker; replace the building fuse. Try another outlet.
	3. Check the extension cord for visible damage. Check the outlet of the extensions cord with a volt meter or a test lamp.	3. Replace the extension cord.
	4. Check the power cord (311) for damage such as broken insulation or wires.	4. Replace the power cord. See page 26.
	5. Check the motor brush leads, the terminals and the brush length. The brush length should be at least 1/2 inch (12 mm). See page 25.	5. Tighten the terminal screws; replace the brushes. See page 25.

**NOTE 1:** Thaw the sprayer in a warm area if water or water-based paint has frozen in it. Do not try to start the sprayer until it has thawed completely. If the bourdon tube was not damaged by the freezing, the pump should operate. If the paint hardened or dried in the sprayer, the pump packings or the bare pressure control must be replaced. See page 36 (pump) or page 29 (pressure control).

## 2 The motor will not operate.

<b>Diagnosing the circuit board indicator lamps.</b> The normal condition is red lamp on, clear lamp on <i>when the board is telling the pump to run.</i>  Follow the <b>Pressure Relief Procedure Warning.</b> (Continued on page 17.)	1. Check the leads from the bridge (308) to the motor to be sure the leads are securely fastened and properly mated.	1. Replace any loose terminals. Crimp the leads. Be sure male terminal blades are straight and firmly connected to mating part.
	2. Check the G1 and G2 connections between the circuit board (23) and the bridge (308) for damage or loose terminals.	2. Clean circuit board male terminals. Replace loose or damaged terminals. Securely re-connect leads.

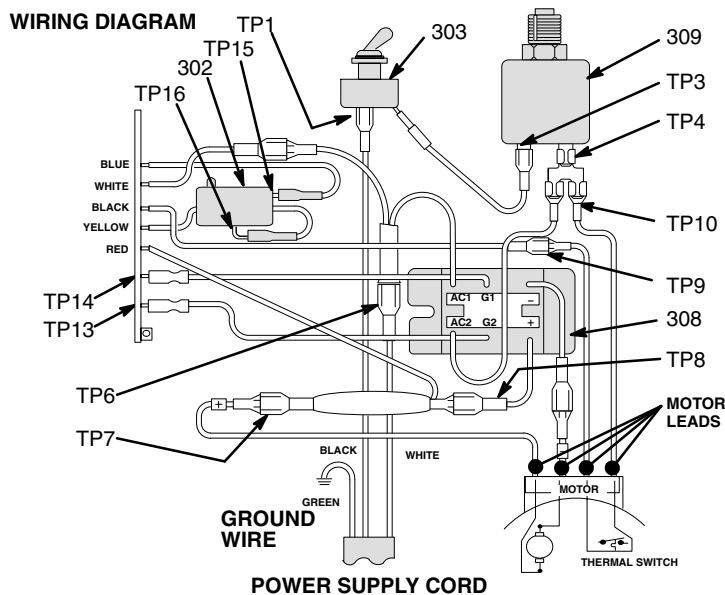


### 3 The motor will not operate.

PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
<p>Remove the gun from the hose. Remove the pressure control cover. Check for a faulty condition of the circuit board lamps.</p> <p><b>Condition A</b> Both lamps on, but the pump won't operate and the motor is not operating.</p>	1. Check the leads from the bridge (308) to the motor to be sure the leads are securely fastened and properly mated.	1. Replace any loose terminals. Crimp the leads. Be sure male terminal blades are straight and firmly connected to mating part.
	2. Check the G1 and G2 connections between the circuit board (23) and the bridge (308) for damage or loose terminals.	2. Clean circuit board male terminals. Replace loose or damaged terminals. Securely re-connect leads.
	3. Check for loose connections and terminals on the motor brushes. See page 25.	3. Tighten terminal screws. Replace brushes if leads are damaged. See page 25.
	4. Check <b>both</b> of the the brushes. The brush length should be at least 1/2 inch (12 mm) long. See page 25.	4. Replace brushes. See page 25.
	5. Check for a broken or a misaligned motor brush spring. The rolled portion of the spring must rest squarely on top of the brush. See page 25.	5. Replace spring if broken. Realign spring with brush. See page 25.
	6. Check to see if the motor brushes are binding in the brush holders. See page 25.	6. Clean the brush holders, using a small cleaning brush. Align the brush leads with the slot in the brush holder to assure vertical brush movement.
	7. Check the motor's commutator for burn spots, gouges, and extreme roughness. See page 25.	7. Remove the motor and have a motor shop resurface the commutator, if possible. See page 34.
	8. Use an armature tester or perform the sping test to check the motor armature for electrical shorts. See page 22.	8. Replace the motor. See page 34.
	9. Check the bridge (308) by substituting it with a good bridge or performing the bridge test. See page 23.  <b>CAUTION:</b> Do not perform this check until the motor armature is determined to be good. A bad armature will immediately burn out a good bridge.	9. Replace the bridge. See page 27.
<p><b>Condition B:</b> Both lamps are off.</p> <p><i>Refer to the wiring diagram on page 18 to identify the test points (TP).</i></p> <p><b>NOTE:</b> Connect the volt meter to the <u>terminal</u>, not to the wire which you disconnect from the terminal.</p>	1. Check the circuit breaker (309) button to be sure it has not popped up.	1. Depress the button to reset the circuit breaker. If circuit breaker or fuse continues to open, see, "There is an electrical short." on page 21.
	2. Check the power cord (311). Disconnect the TP6 female (neutral) and the TP1 female. Connect a volt meter to these leads. Plug in the sprayer. The meter should read 105 to 125 VAC. Unplug the sprayer. Reconnect the TP1.	2. Replace the power cord. See page 26.
	3. Check the ON/OFF switch (303). Disconnect the TP2 and connect the volt meter to the TP6 female and the TP2 male. Plug in and turn on the sprayer. The meter should read 105 to 125 VAC. Turn off and unplug the sprayer. Reconnect the TP2.	3. Replace the ON/OFF switch. See page 26.
	4. Check the jumper wire (306). Disconnect the TP3. Connect a volt meter between TP6 female and TP3 female. Plug in and turn on the sprayer. The meter should read 105 to 125 VAC. Turn off and unplug the sprayer. Reconnect the TP3.	4. Replace the jumper wire. See page 26.
	5. Check the circuit breaker (309). Connect a volt meter between TP6 female and TP4. Plug in and turn on the sprayer. The meter should read 105 to 125 VAC. Turn off and unplug the sprayer.	5. Replace the circuit breaker. See page 27.

## 2. The motor will not operate. (Continued)

PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
<b>Condition B (continued)</b>  <b>Both lamps are off</b>  <i>Refer to the wiring diagram below to identify the test points (TP).</i>	6. Check the motor's thermal cutout switch. Connect a volt meter between TP6 female and TP9 female. Plug in and turn on the sprayer. The meter should read 105 to 125 VAC. Turn off and unplug the sprayer.	6. Allow the motor to cool. Correct the cause of overheating. If the switch remains open after the motor cools, check the continuity between the TP9 female and TP10 with ohm-meter. If open, replace the motor.
	7. Check the microswitch (302). Reconnect the TP6 connectors. Connect the volt meter to TP15 male and TP4. The meter should read 50–125 VAC.	7. Clean the male terminals of the microswitch. Replace any loose or damaged terminals. Securely reconnect the leads.
	8. Inspect the microswitch (302) button. The adjustment stud should not depress the button when the fluid pressure is zero. Depress the button with a small screwdriver; an audible click indicates that the microswitch is in the normal position.	8. The microswitch is faulty. Return the sprayer for repair.
	9. Check the microswitch (302) continuity with an ohm meter. <i>Be sure the sprayer is unplugged!</i> The meter should read zero ohms with no fluid pressure in the sprayer.	9. The microswitch is faulty. Return the sprayer for repair.
	10. Check all the terminals for damage or a loose fit. Reconnect the TP6 connectors.	10. Replace any damaged terminals and reconnect the terminals securely.
	11. Check the circuit board (71) by substituting it with a good board. See page 28.	11. Replace the circuit board. See page 28.



<b>Condition C</b> The red lamps are on. The clear lamp is off.  <i>Unplug the sprayer!</i>	1. Check the circuit board (71) by removing it from the box <i>without</i> disconnecting the wires; see page 28 for the procedure.  <b>WARNING:</b> Turn on the sprayer just long enough to check the lamp condition, then shut off the sprayer. The procedure in Step 1 could allow the sprayer to over-pressurize.  <b>WARNING:</b> To reduce the risk of an electric shock, handle the circuit board by the edges only! Do not allow any metal objects to come in contact with the circuit board.  Plug in and turn on the sprayer. The clear-colored lamp should be on now. Turn off and unplug the sprayer.	1. Replace the circuit board. See page 28.  <p>01222</p>
	2. Check bourdon tube flag (B) and the position of the detector. Reinstall the circuit board (see page 28). Turn the pressure setting to maximum; the flag should extend less than half way into the optical detector slot from the bottom.	2. Perform the pressure control adjustment to see if that corrects the problem. See page 30. If not, replace bare pressure control (301). See page 29.

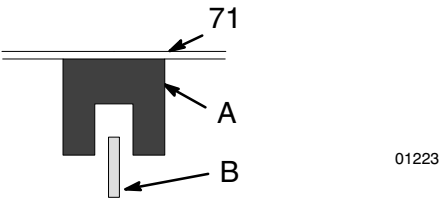
## 4 The fluid output is low.

PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
The fluid output is low.	1. Check for worn spray tip.	1. Follow <b>Pressure Relief Procedure Warning</b> then replace tip. See your separate gun or tip manual.
	2. Check to see that the pump does not continue to stroke when the gun trigger is released. Plug in and turn on the sprayer. Prime the sprayer. Trigger the gun briefly, then release and lock the trigger safety. Relieve the pressure, turn off and unplug the sprayer.	2. Service pump. See pages 37.
	3. Check the electrical supply with a volt meter. The meter should read 105–125 VAC.	3.. Reset building circuit breaker; replace building fuse. Repair electrical outlet or try another outlet.
	4. Check the extension cord size and length; it must be at least 12 gauge wire and no longer than 150 ft.	4. Replace with a correct, grounded extension cord.
	5. Check the G1 and G2 leads from the bridge (308) to circuit board (71) for damaged or loose wires or connectors. Refer to Fig. 17, page 27.	5. Clean circuit board male terminals. Replace loose or defective lead terminals. Securely reconnect lead terminals to board.
	6. Check stall pressure. Refer to Pressure Control Adjustment on page 30.	6. Perform pressure control adjustment. See page 30.
	7. Check bridge (308) + and – leads and terminals to motor. Inspect wiring insulation and terminals for signs of overheating. See page 27.	7. Be sure male terminal blades are centered and firmly connected to female terminals. Replace any loose terminal or damaged wiring. Securely reconnect wires to bridge.
	8. Check for loose motor brush leads and terminals. See page 25.	8. Tighten terminal screws. Replace brushes if leads are damaged. See page 25.
	9. Check for worn motor brushes which should be 1/2" minimum. See page 25.	9. Replace brushes. See page 25.
	10. Check for broken and misaligned motor brush springs. Rolled portion of spring must rest squarely on top of brush.	10. Replace spring if broken. Realign spring with brush. See page 25.
	11. Check motor brushes for binding in brush holders. See page 25.	11. Clean the brush holders, remove carbon dust with a small cleaning brush. Align the brush lead with the slot in the brush holder to assure unhindered vertical brush movement.
	12. Check circuit board (71) by substituting with a good circuit board. See page 28.	12. Replace the circuit board. See page 28.
	13. Check motor armature for shorts by using an armature tester (growler) or perform spin test. See page 22.	13. Replace the motor. See page 34.
	14. Check bridge (308) by substituting with a good bridge or by performing the bridge test. See page 23 or 27.  <b>CAUTION:</b> Do not perform this check until armature is determined to be good. A bad armature will immediately burn out a good bridge.	14. Replace the bridge. See page 27.

## 5 There is no fluid output.

PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
The motor operates and the pump cycles.	1. Check paint supply.	1. Refill and reprime pump.
	2. Check for clogged intake strainer.	2. Remove and clean, then reinstall.
	3. Check for loose suction tube or fittings.	3. Tighten; use thread sealant or sealing tape on threads if necessary.
	4. Check to see if intake valve ball and piston ball are seating properly. See page 37.	4. Remove intake valve and clean. Check balls and seats for nicks; replace if necessary. See page 36. Strain paint before using to remove particles that could clog the pump.
	5. Check for leaking around throat packing nut which may indicate worn or damaged packings. See page 37.	5. Replace packings. See page 37. Also check piston valve seat for hardened paint or nicks and replace if necessary. Tighten the packing nut/wet-cup.
The motor operates but the pump does not cycle.	1. Check displacement pump connecting rod pin (43). See Fig. 29, page 36.	1. Replace pin if missing. Be sure retainer spring (42) is fully in groove all around connecting rod. See Fig. 29, page 36.
	6. Check connecting rod assembly (68) for damage. See page 32.	2. Replace connecting rod assembly. See page 32.
	7. Be sure crank in drive housing rotates; plug in sprayer and turn on briefly to check. Turn off and unplug sprayer. See page 33.	3. Check drive housing assembly for damage and replace if necessary. See page 33.

## 6 There are excessive fluctuations of the pressure.

PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
There are variations in the spray pattern.	1. Be sure both G1 and G2 leads from bridge (308) to circuit board (71) are firmly connected. See Fig. 17, page 27.	1. Reconnect securely. See page 27.
	2. Check maximum working pressure adjustment. Refer to Pressure Control Adjustment on page 30.	2. Perform pressure control adjustment. See page 30.
	3. Check bourdon tube flag (B) and the detector (A) position. Turn pressure setting to maximum; flag should not drag or bind in optical detector slot of circuit board (71).	3. Carefully bend flag into alignment with detector slot to see if that corrects problem. If not, replace bare pressure control assembly (301). Perform pressure control adjustment after reassembly.
		
	4. Check circuit board (71) by substituting with a good board. See page 28.	Replace circuit board. See page 28.
5. Check section 4 on page 19.		

## 7 The motor is hot and operates intermittently.

PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
The motor is hot and operates intermittently.	1. Determine if sprayer was operated at high pressure with small tips, which causes low motor RPM and excessive heat build up.	1. Decrease pressure setting or increase tip size.
	2. Be sure ambient temperature where sprayer is located is no more than 90°F and sprayer is not located in direct sun.	2. Move sprayer to shaded, cooler area if possible.
	3. Determine if was sprayer turned on, pressurized, but not operating for long periods of time.	3. Turn off sprayer whenever you stop spraying for a while and relieve fluid pressure.

## 8 There is an electrical short.

PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
<p>The building's circuit breaker opens as soon as the sprayer switch is turned on.</p> <p><b>CAUTION</b> An electrical short in any part of the motor's power circuit, which is connected to the output side of the bridge, will cause the bridge to burn out immediately. Correctly diagnose and repair all the electrical shorts before checking and replacing the bridge.</p>	1. Check all electrical wiring for damaged insulation, and all terminals for loose fit or damage. Also check wires between pressure control and motor which are encased in conduit (1). See page 34.	1. Repair or replace any damaged wiring or terminals. Securely reconnect all wires.
	2. Check for missing inspection plate gasket (see page 25), bent terminal forks or other metal to metal contact points which could cause a short.	2. Correct faulty conditions.
	3. Check motor armature for shorts. Use an armature tester (growler) or perform spin test. See page 22. Inspect windings for burns.	3. Replace motor. See page 34.
	4. Check bridge (308) by substituting with a good bridge or by performing bridge test. See page 23 or 27. <b>CAUTION:</b> Do not check bridge until armature is determined to be good. A bad armature will immediately burn out a good bridge.	4. Replace bridge. See page 27.
The building's circuit breaker opens as soon as the sprayer is plugged into an outlet and the sprayer is NOT turned on.	1. Check section 1, "The sprayer will not operate.", on page 16.	
	2. Check ON/OFF switch (302) See page 26. <i>Be sure the sprayer is unplugged!</i> Disconnect wires from switch. Check switch with ohmmeter. The reading should be infinity with the ON/OFF switch OFF, and zero with the switch ON. <b>CAUTION:</b> A short in the motor circuit burns the bridge out immediately, which usually causes the ON/OFF switch to fail in the closed mode.	2. Replace ON/OFF switch. See page 26.
The sprayer circuit breaker opens after the sprayer operates for 5 to 10 minutes.	1. Check electrical supply with volt meter. Meter should read 105 to 125 VAC.	1. If voltage is too high, do not operate sprayer until corrected.
	2. Check tightness of pump packing nut. Overtightening tightens packings on rod, restricts pump action, and damages packings.	2. Loosen the packing nut. Check for leaking around the throat packings. Replace the pump packings, if necessary. See page 36.
	3. Check maximum working pressure adjustment.	3. Perform pressure control adjustment. See page 30.
	4. After determining that there is no short in system, reset circuit breaker button.	4. If circuit breaker continues to open (button pops up), replace the circuit breaker. See page 27.

# Spin Test

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

Use the spin test to check the armature, the motor windings, and the electrical continuity of the motor brushes.

### Set up the spin test.

1. Relieve the pressure.
2. Remove the drive housing. See page 33.
3. Remove the pressure control cover, the shield (59), the fan cover (F), and both of the inspection covers (J). See Fig. 8.
4. Disconnect the two leads going from the motor to the bridge (308). See Fig. 9.

### Test the armature for an electrical short circuit.

1. Relieve the pressure.
2. Quickly and manually turn the motor fan. If there are no electrical shorts, the motor will spin two or three revolutions before completely stopping. If the motor does not spin freely, the armature is electrically shorted and the motor must be replaced. See page 34.

### Test for electrical continuity between the armature, the brushes, and the motor wiring.

1. Relieve the pressure.
2. Connect the two, black motor-leads together with a test lead.
3. Manually turn the motor fan at about two revolutions per second. If there is uneven turning resistance or no turning resistance when turning the fan, check the motor brush area. Repair or replace parts that are loose, worn or damaged. See page 25. If there is still a problem with the turning resistance, replace the motor. See page 34.

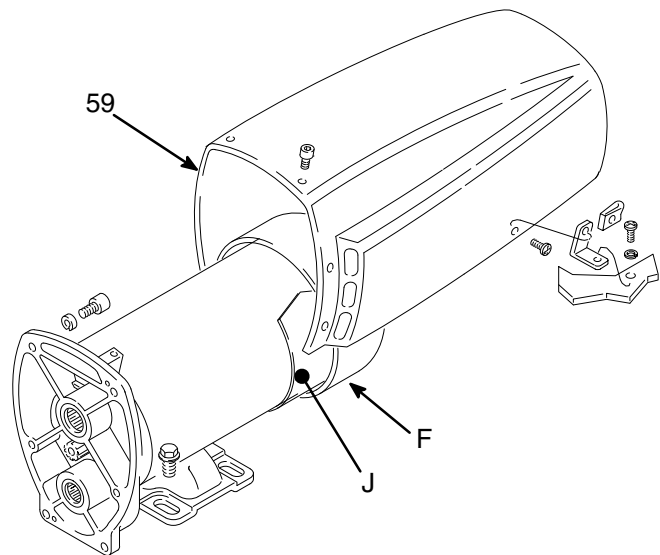


Fig. 8

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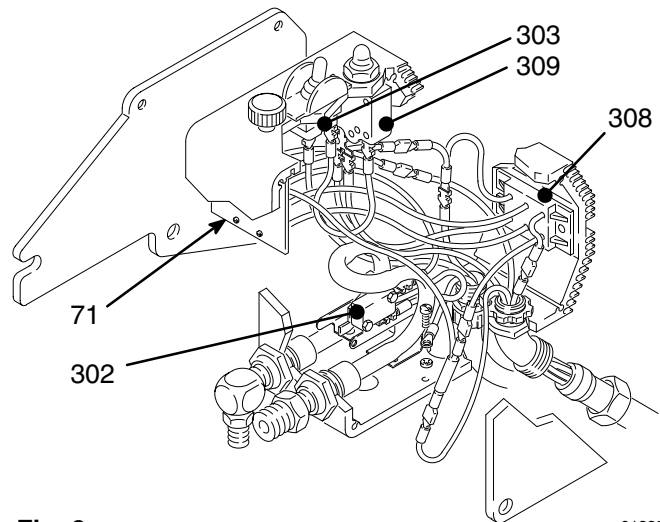


Fig. 9

01225

# Bridge Test

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

Remove the bridge from the pressure control. Perform this test to determine if the bridge is functional. See the **Bridge Replacement** on page 27. Use a continuity tester, such as multi-meter, set on the X1 ohms scale.

Perform all the tests in the chart. If the bridge fails even one test, it must be replaced.

Fig. 10 shows the position of the wires on the bridge. Using the chart at the right, connect the meter wires as indicated by the black dots for each test, and then check the continuity.

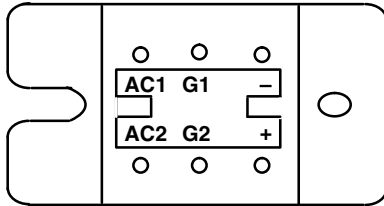


Fig. 10

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In Tests 1, 2 and 3, there should be NO continuity.

In Tests 4, 5 and 6, connect the + and – meter wires as indicated, check continuity, then switch the meter wire connections and check continuity again. There should be NO continuity one way and YES continuity the other way.

In Tests 7 and 8, connect the meter wires as indicated by the black dots. Touch the indicated “G” wire to one meter wire and then to the other meter wire. There should be NO continuity one way and YES continuity the other way.

## BRIDGE WIRES

CONTINUITY	G2	G1	-	+	AC1	AC2	
NO					•	•	TEST 1
NO				•		•	TEST 2
NO				•	•		TEST 3
YES / NO			•	•	•	•	TEST 4
YES / NO			•	•	•	•	TEST 5
YES / NO			•	•			TEST 6
YES / NO		○	•	•	OR	•	TEST 7
YES / NO		○	•	•	OR	•	TEST 8

# General Repair Information

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

## CAUTION

To reduce the risk of a pressure control malfunction, follow these precautions.

- Use needle-nose pliers to disconnect the wires.
- Be sure the flat blade of the insulated male connector is centered in the wrap-around blade of the female connector.
- Route the electrical wires carefully through the center of the U-shaped bourdon tube. Avoid interference from the circuit board and between the pressure control and cover.

## WARNING

To reduce the risk of a serious injury, including electric shock or a burn, follow these precautions when repairing the sprayer.

- Do not touch any moving parts or electrical parts with your fingers or a tool while inspecting the repair.
- Shut off the sprayer and unplug the sprayer as soon as you complete the inspection.
- Reinstall all of the covers, gaskets, screws, and washers before operating the sprayer.
- Do not touch the motor or the drive housing during operation. These parts may be very hot.
- A fire or an explosion could result if flammable fluids are spilled on a hot, bare motor.
- Always have the motor shield in place during regular operation.

## These tools are needed for the repairs.

Phillips® screwdriver  
Small, flat-blade screwdriver  
Needle-nose pliers  
Plastic mallet  
Adjustable wrench  
Adjustable, open-end wrench  
Torque wrench  
1/4 inch hex-key wrench  
3/16 inch hex-key wrench  
5/8 inch socket wrench  
3/8 inch open-end wrench  
1/2 inch open-end wrench  
3/4 inch open-end wrench  
7/8 inch open-end wrench  
High-quality motor oil  
Bearing grease

1. Keep all the screws, nuts, washers, gaskets, and electrical fittings that are removed during the repair procedures. These parts are not normally provided with the replacement assemblies.
2. Clean and inspect all parts. Replace worn or damaged parts. If you are using a repair kit, use all of the new parts in the kits even if the old parts still look good.
3. Test the repair before the regular operation of the sprayer to be sure the problem is corrected.
4. Replace the motor shield if it is damaged. The shield directs air around the motor to help prevent overheating.
5. If the sprayer does not operate properly, review the repair procedure again to verify that everything was done correctly. If necessary, refer to the troubleshooting section, pages 16–21, to help identify other possible problems and solutions.

## CAUTION

Do not operate the sprayer without fluid in it for more than 30 seconds, to avoid damaging the pump packings.



# Motor Brush Replacement

**NOTE:** Replace the brushes when they have worn to about 1/2 inch (10 mm) in length. Check both of the brushes. A Brush Repair Kit, part number 220–853, and a new spring clip, part number 110–816, may be purchased separately.

**NOTE:** The replacement brushes may last only half as long as the original brushes. To maximize the life of the brushes, operate the sprayer for at least one hour without allowing the pump to stroke. See Steps 10 to 12.

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

1. Relieve the pressure.
2. Remove the shield (14). Remove the covers (A) from both brush inspection ports. See Fig. 11.

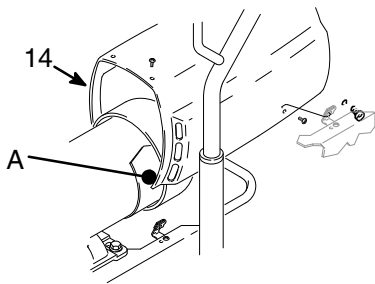


Fig. 11 01224A

3. Push in the clip (D) to unhook it, and then pull out the clip. See Fig. 12.
4. Loosen the screw (F). Pull away the brush's electrical lead (E), leaving the motor's electrical lead (G) in place. Remove the brush (C) and the spring (B). See Fig. 13.
5. Inspect the motor's commutator for excessive pitting, burning or gouging. A black color on the commutator is normal. If the brushes seem to wear too quickly, have the commutator resurfaced by a qualified motor repair shop.
6. Install the new brush (C) so its electrical lead is in the long slot (K) of the brush holder (H). Slide the terminal of the brush's electrical lead (E) under the washer of the screw (F). Make sure the motor's electrical lead (G) is still connected to the screw. Tighten the screw (F). See Fig. 14.
7. Place the spring (B) on the brush (C) as shown in Fig. 14.
8. Push in the clip (D) and hook it. See Fig. 14.
9. Repeat this procedure for the other side.

10. Test the brushes.
  - a. Remove the connecting rod pin (20) only. See page 36.
  - b. Turn off the sprayer. Turn the pressure-control knob to the minimum setting. Plug in the sprayer.
  - c. Turn on the sprayer. Slowly increase the pressure until the motor is at the full speed.
  - d. Inspect the contact area of the brush and the commutator. The arcs should not circle around the commutator surface.

## CAUTION

Do not touch the brushes, leads, springs, or brush holders while the sprayer is plugged in, to reduce the risk of an electric shock and a serious injury.

11. Install the brush inspection plates, the gaskets, and the covers.
12. Operate the sprayer for at least one hour. Then, install the pump connecting rod pin. See page 36.

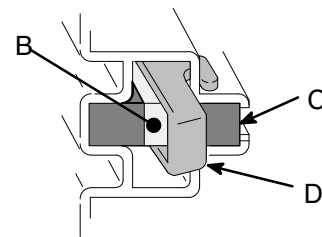


Fig. 12 01227

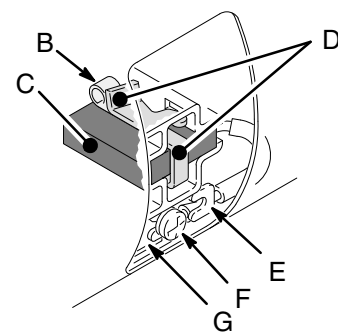


Fig. 13 01227

1. The spring must coil in this direction.
2. The minimum brush length is 1/2 inch (10 mm).

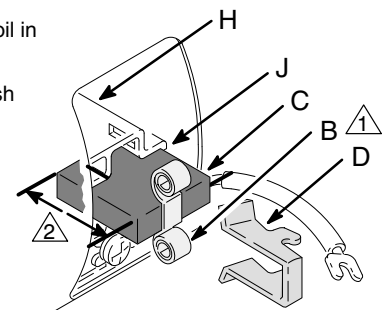


Fig. 14 01227

# Power Cord Replacement

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

**NOTE:** Refer to Fig. 15 for this procedure.

1. Relieve the pressure.
2. Remove the pressure control cover (63).
3. Disconnect the electrical lead for the power cord from the ON/OFF switch (303). Disconnect the white wire going to the bridge (308). Disconnect the green wire to the grounding screw (343).
4. Loosen the bushing (328). Remove the power cord (311).
5. Install the new power cord (311) in the reverse order of disassembly.

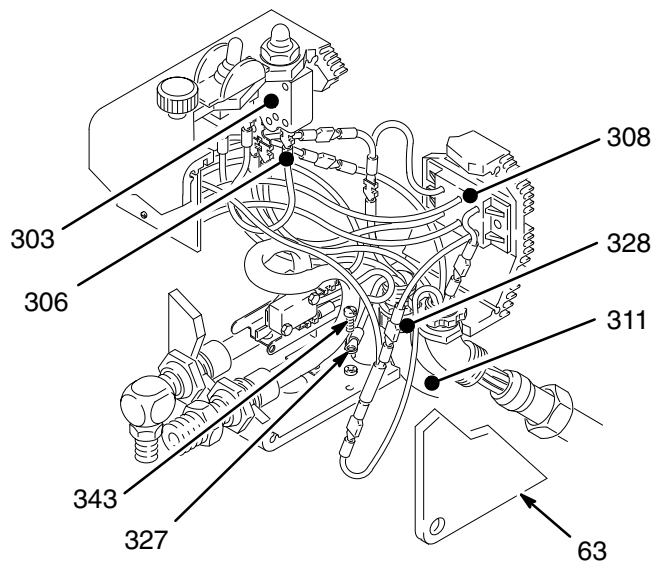


Fig. 15

01225

# On/Off Switch Replacement

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

**NOTE:** Refer to Fig. 16 for this procedure.

1. Relieve the pressure.
2. Remove the cover (63). See Fig. Fig. 15.
3. Disconnect the upper terminal wire from the micro-switch (302) and the two black wires from the ON/OFF switch (303). See Fig. 15.
4. Using a 5/8 inch socket wrench, remove the nut and rubber boot (304). Remove the switch guard (305). See Fig. 16.
5. Remove the ON/OFF switch (303). See Fig. 16.
6. Install the new switch. The internal tab of the ring (W) must engage with the vertical groove in the threads of the switch. The external tab must engage with the blind hole (D) of the pressure control. See Fig. 16.

7. Install the guard (305). Align the internal tab with the groove in the threads.
8. Sprinkle talcum powder on the inside of the boot (304). Shake out the excess powder.
9. Install the nut and the rubber boot. Tighten the nut.
10. Reconnect all of the wires.

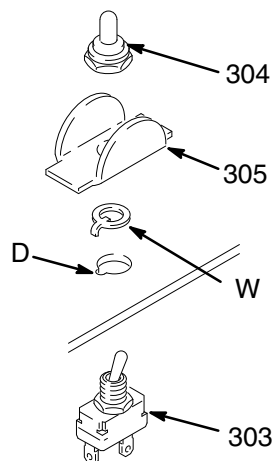


Fig. 16

01228

# Bridge Replacement

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

**NOTE:** *The most common cause of a bridge failure is a faulty motor.* Check the motor before replacing the bridge to prevent damaging the new bridge.

**NOTE:** Refer to Fig. 17 for this procedure.

1. Relieve the pressure.
2. Remove the cover (63) of the pressure control.
3. Disconnect all the wires from the bridge (308).

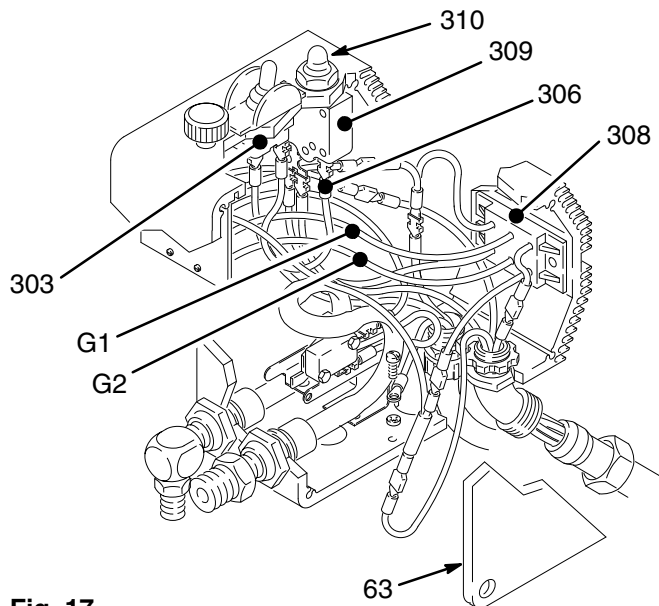


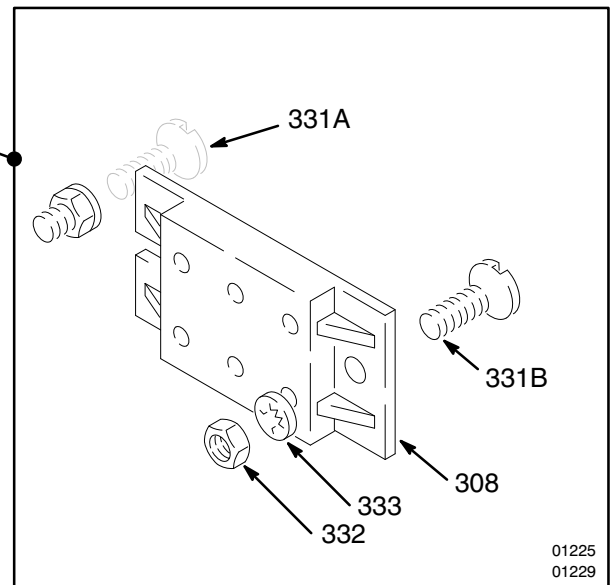
Fig. 17

4. **Loosen** but do not remove the screw (331A). Remove the screw (331B). Slide out the bridge.
5. Install the new bridge (308). Be sure the lockwashers (333) are IN FRONT of the bridge. Tighten the screws (331) securely.

## CAUTION

The lockwashers (333) must be in front of the bridge to avoid overheating, which will cause the bridge to fail. See the detail in Fig. 17.

6. Connect all the wires properly and route them carefully.



01225

01229

# Circuit Breaker Replacement

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

**NOTE:** Refer to Fig. 17 for this procedure.

1. Remove the cover (63).
2. Use a small screwdriver to slide the terminal off of the circuit breaker (309).
3. Disconnect the black wire (306) between the circuit breaker (309) and the switch (303).

4. Use a 5/8 inch socket wrench to loosen the nut and the boot (310) on the circuit breaker.
5. Push down on the top of the circuit breaker (309) and pull it out of the pressure control.
6. Install the new circuit breaker in the reverse order of disassembly.

## CAUTION

Do not allow the contacts of the circuit breaker to touch the bourdon tube, which will cause an electrical short. Firmly tighten the nut on the circuit breaker to prevent the circuit breaker from turning.

# Circuit Board Replacement

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

**NOTE:** Refer to Fig. 18 and 19 for this procedure.

1. Relieve the pressure.
2. Remove the cover from the pressure control.
3. Turn the pressure to the minimum setting to release the spring tension on the board. Be sure that only three or four threads on the shaft of the pressure-control knob are exposed below the pressure-adjustment nut (S). Loosen the nut, if necessary.

## CAUTION

Step 2 is essential to reduce the risk of damaging the circuit board while removing or installing it.

4. Disconnect the seven wires from the board. Pay close attention to where the connections are made.
5. Pull out the plastic-tipped pin (330). Push the bottom of the circuit board (71) toward the wall of the pressure control and carefully slide out the board.
6. Reinstall the new board in the pressure control at the same angle as it was removed.
7. Reconnect all of the wires. Ease the pin (330) into the retainer.
8. Perform the **Pressure Control Adjustment**, page 30, if you installed a new board.

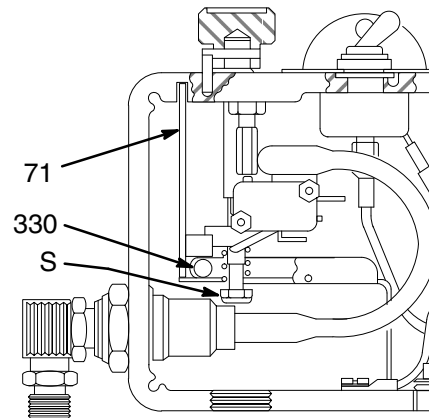


Fig. 18

01230

- A Blue
- B White
- C Black
- D Yellow
- E Red

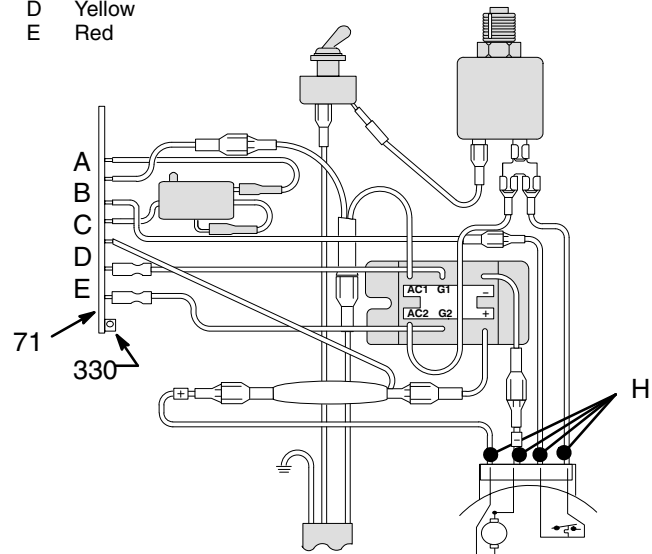


Fig. 19

01221A

# Pressure Control Replacement

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

**NOTE:** Refer to Fig. 20 for this procedure.

1. Relieve the pressure.
2. Disconnect the hose (70) at the pressure control.
3. Loosen the nut (38).
4. Hold the hex of the adapter (341) firmly with a wrench. Use an adjustable wrench to unscrew the swivel union (39). Remove the fluid filter (66).
5. Remove the screws (36) and cover (63). Disconnect the four motor leads. See Fig. 19.
6. Remove the circuit board and retain it. See page 28.

7. Remove the conduit (1).
8. Remove the three screws (8), lockwashers (10) and nuts (11). Remove the pressure control.
9. Remove the screws (22) and the bracket (64).

## CAUTION

To avoid damage to the bourdon tube, do not allow the adapter (341) to turn while installing the new pressure control. Hold the adapter firmly with a wrench while screwing in the swivel union (39).

10. Install the new pressure control in the reverse order of disassembly. Install the seal (29) around the wires in the elbow (345) of the pressure control. The seal keeps the contaminants from entering the conduit and the motor.
11. Perform the **Pressure Control Adjustment**, page 30, before regular operation of the sprayer.

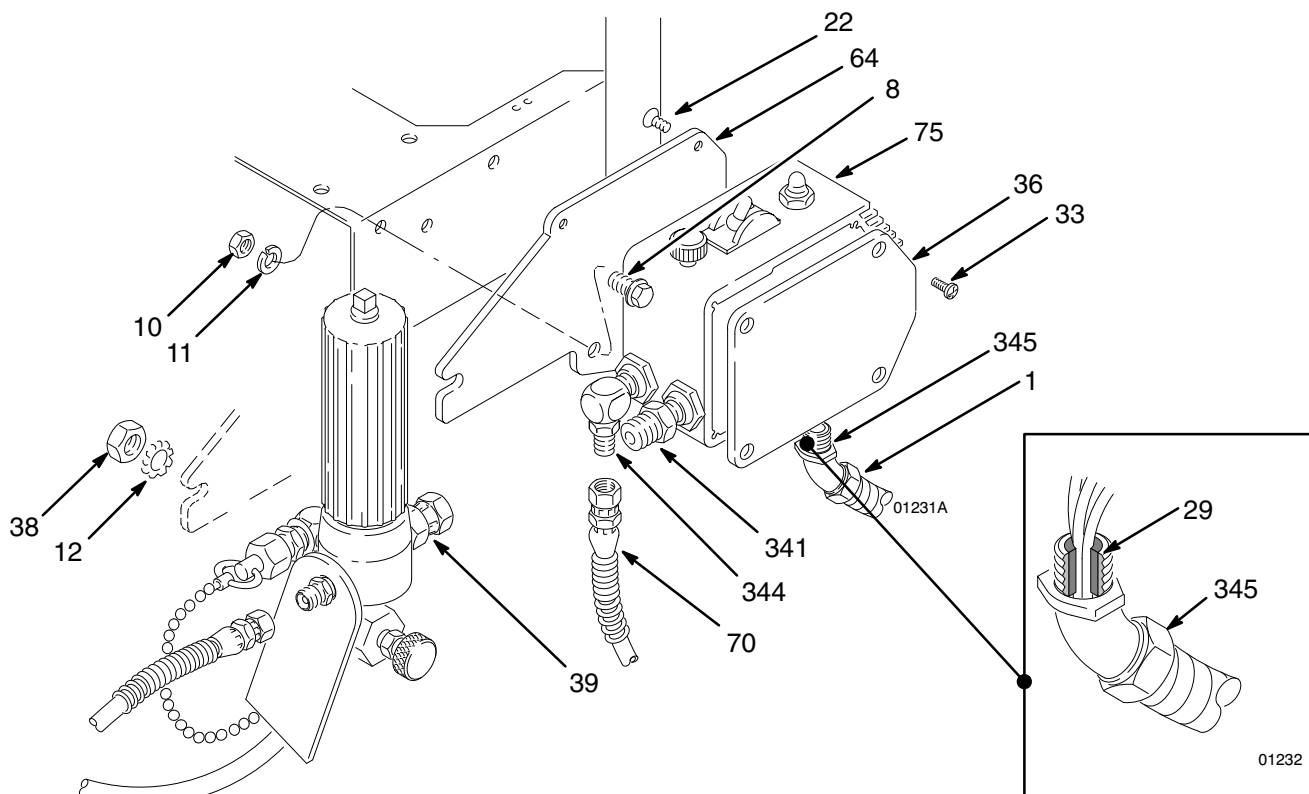


Fig. 20

# Pressure Control Adjustment

## WARNING

Use extreme caution when performing this adjustment procedure to reduce the risk of a fluid injection injury or other serious injury which can result from component rupture, electric shock, fire, explosion, or moving parts.

This procedure sets the sprayer to 3000 psi (210 bar) Maximum Working Pressure and sets the overpressurization switch (microswitch) to approximately 3600 psi (242 bar).

Perform this procedure whenever the pressure control is removed, installed or replaced, and whenever a new circuit board is installed.

An improper adjustment can cause the sprayer to over-pressurize and result in component rupture, fire or explosion. It can also prevent the sprayer from obtaining the maximum working pressure, resulting in poor sprayer performance.

Never try to increase the maximum working pressure beyond 3000 psi (210 bar) by performing these adjustments in any other way. Normal operation of the sprayer at higher pressures may result in component rupture, fire, or explosion. To perform this adjustment, however, the sprayer pressure must be *temporarily* increased above the normal working pressure.

Use a *new*, 50 ft (15.2 m) spray hose rated for at least 3000 psi (210 bar) Maximum Working Pressure. A used, under-rated hose could develop a high-pressure leak or rupture.

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

4. Place the pump's suction tube in a pail of clean water.
5. Be sure the gun trigger safety is locked.
6. Plug in the sprayer.

### These tools are required for the pressure control adjustment.

3/8 inch nut driver or 3/8 inch socket wrench  
1/4 inch open-end wrench  
7/16 inch open-end wrench  
0 – 5000 psi, oil-filled pressure gauge,  
Part No. 102-814  
Pail of clean water  
Mineral spirits  
New spray hose,  
3000 psi (210 bar) maximum working pressure,  
Part No. 223-541

1. Relieve the pressure.
2. Replace the plug (A) at the top of the fluid filter with a gauge. Connect the gun to the new spray hose. Connect the hose to the outlet (B). See Fig. 21.
3. Remove the cover of the pressure control.

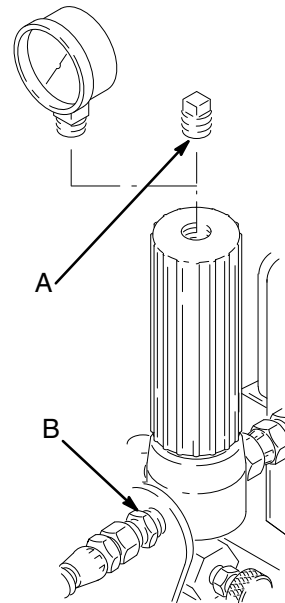


Fig. 21

03748A

# Pressure Control Adjustment

- Turn the pressure-control knob (B) to the *minimum* setting (fully counterclockwise). Turn on the sprayer. **The pump should not cycle.** See Fig. 22.

**If the pump does cycle**, remove the plug (17) from the bottom of the pressure control. Insert a 3/8 inch nut driver through the opening, and unscrew the adjustment nut (T) just until the sprayer stops operating.

## Adjust the overpressurization switch.

- Trigger the gun and **slowly** turn the pressure-control knob clockwise just until the sprayer starts. Prime the pump and hose.
- Slowly turn the pressure-control knob to the maximum setting. Now, observe the gauge and the red light on the circuit board. Turn the nut (T) **slowly** to increase the pressure until the red light goes out **and** the gauge reads between 3400 – 3800 psi (238 – 266 bar).

**If the red light does not go out by 3800 psi (266 bar)**, loosen the nut (P) and adjust the stud (Q) until the light goes out.

**If the red light goes out before 3400 psi (238 bar)**, loosen the nut (P) and adjust the stud (Q) until the light goes out between 3400 – 3800 psi (238 – 266 bar).

- Tighten the nut (P) if it was loosened in Step 9.
- Trigger the gun to relieve the pressure. Release the trigger and lock the gun trigger safety. Repeat Step 9 to verify the results.
- Install the cover on the pressure control.

## Adjust the maximum working pressure.

- Turn off the sprayer. Unlock the gun trigger safety. Trigger the gun into a grounded waste-container until the pressure is relieved. Lock the gun trigger safety.
- Use the 3/8 inch nut driver to turn the pressure adjustment nut (T) counterclockwise, one full turn.

- With the pressure-control knob at the *minimum* setting, turn on the sprayer.
- Slowly* turn the pressure-control knob (B) clockwise to the maximum setting and hold it there. Use a 3/8 inch nut driver or a socket wrench to slowly turn the pressure adjustment nut (T) clockwise until the gauge reads **EXACTLY** 3000 psi (210 bar).
- Turn the pressure-control knob to the minimum setting. Release the gun trigger safety. Trigger the gun into a grounded waste-container until the pressure is relieved. Lock the gun trigger safety. Slowly increase the pressure to verify that the maximum working pressure is set at 3000 psi (210 bar).

## CAUTION

To prevent corrosion in the pump, use mineral spirits to flush the water out of the pump, the hose, and the gun. Follow the flushing procedure on page 15.

- Install the plug (17) in the bottom of the pressure control. Remove the gauge and reinstall the plug. Flush out the water with mineral spirits.

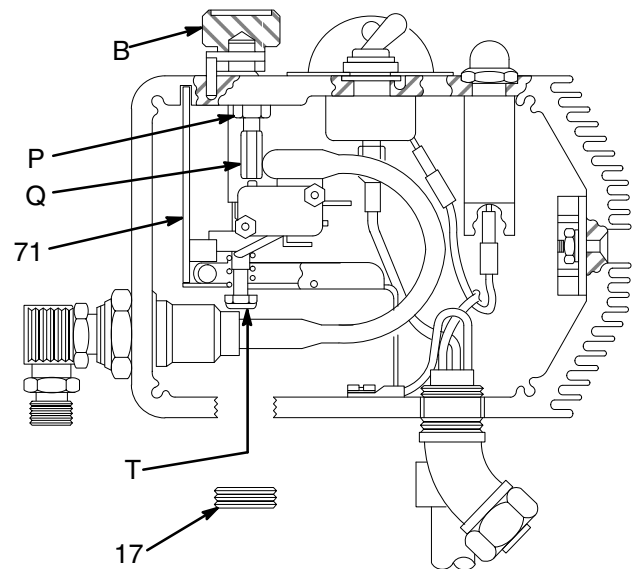


Fig. 22

01243

# Bearing Housing and Connecting Rod Replacement

- 1. Pack the roller bearing with grease.
- 2. Oil the inner surface of the bearing housing.
- 3. Torque to 175 in-lb (19 N.m).

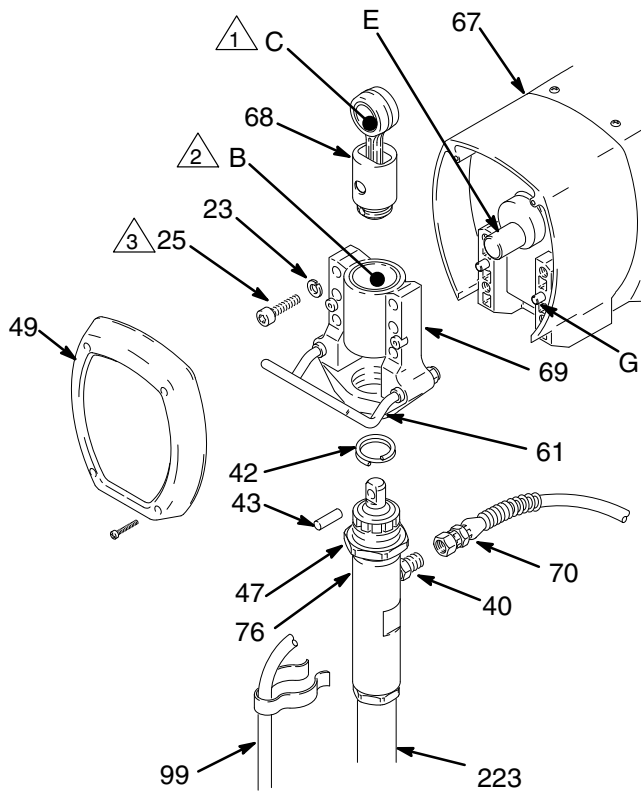


Fig. 23 03751

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

**NOTE:** Stop the sprayer at the bottom of its stroke to get the crank (E) in its lowest position. To lower the crank manually, use a screwdriver to carefully rotate the blades of the fan.

1. Relieve the pressure.

2. Remove the front cover (49). Disconnect the drain hose (99) from the pump. Hold a wrench on the intake valve (223). Unscrew the suction tube. Disconnect the hose (70).
3. Push up the retaining spring (42). Push out the pin (43).
4. Loosen the locknut (47). Unscrew the pump (76).
5. Remove the four screws and lockwashers (25,23).
6. Lightly tap the lower rear of the bearing housing (69) with a plastic mallet to loosen it from the drive housing (67). Pull the bearing housing and the connecting rod (68) straight off the drive housing.
7. Remove the pail hanger (61) and install it on the new bearing housing.
8. Inspect the crank (E) for excessive wear. Lubricate the inside of the bronze bearing (B) with a high-quality motor oil. Pack the roller bearing (C) with a liberal amount of bearing grease.
9. Assemble the connecting rod (68) and the bearing housing (69).
10. Clean the mating surfaces of the bearing housing and the drive housing (69,67).
11. Align the connecting rod (68) with the crank (E). Align the locating pins (G) with the holes in the bearing housing (69). Push the bearing housing onto the drive housing or tap the bearing housing into place with a plastic mallet.

## CAUTION

Do not use the screws (25) to try to align the bearing housing. The bearing housing and drive housing will not align properly, which will result in premature wear of the bearing.

12. Install the screws (25) and the lockwashers (23). Torque the screws evenly to 175 in-lb (19 N.m).
13. Install the pump. See page 38.
14. Install the remaining parts.



# Drive Housing Replacement

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

## CAUTION

Do not drop the gear (51) when removing the drive housing (67). The gear may stay engaged in the front of the motor or the drive housing.

Do not lose the balls (9) which are located at each end of the gear (51). Do not drop the balls between the gears. The balls, which are heavily covered with grease, usually stay in place, but could be dislodged. If the balls fall into the gears and are not removed, the balls will seriously damage the drive housing. If the balls are not in place, the bearings will wear prematurely.

1. Relieve the pressure.
2. Remove the cover (49) and the shield (59). Unclip the drain hose (99) from the pump.
3. Remove the four screws (25).
4. Tap the lower-rear portion of the bearing housing (69) with a plastic mallet to loosen the bearing housing from the drive housing (67). Pull the bearing housing and the connecting rod straight off of the drive housing.
5. Remove the two screws (26).
6. Remove the two lower screws (13) and then remove the two upper screws (16) from the motor.
7. Tap the drive housing with a plastic mallet to loosen the drive housing from the motor (73). Pull the drive housing straight off of the motor.
8. Apply grease to the gear (51) until the area contains a total of 4 ounces (112 grams) of grease. The grease is supplied with the drive-housing replacement kit. Be sure the balls (9) are in place.
9. Place the bronze-colored washer (67b) and then the silver-colored washer (67a) on the shaft which protrudes from the big gear in the drive housing (67).
10. Align the gears and push the new drive housing straight on to the front of the motor and the locating pins.
11. Continue to reassemble the sprayer.

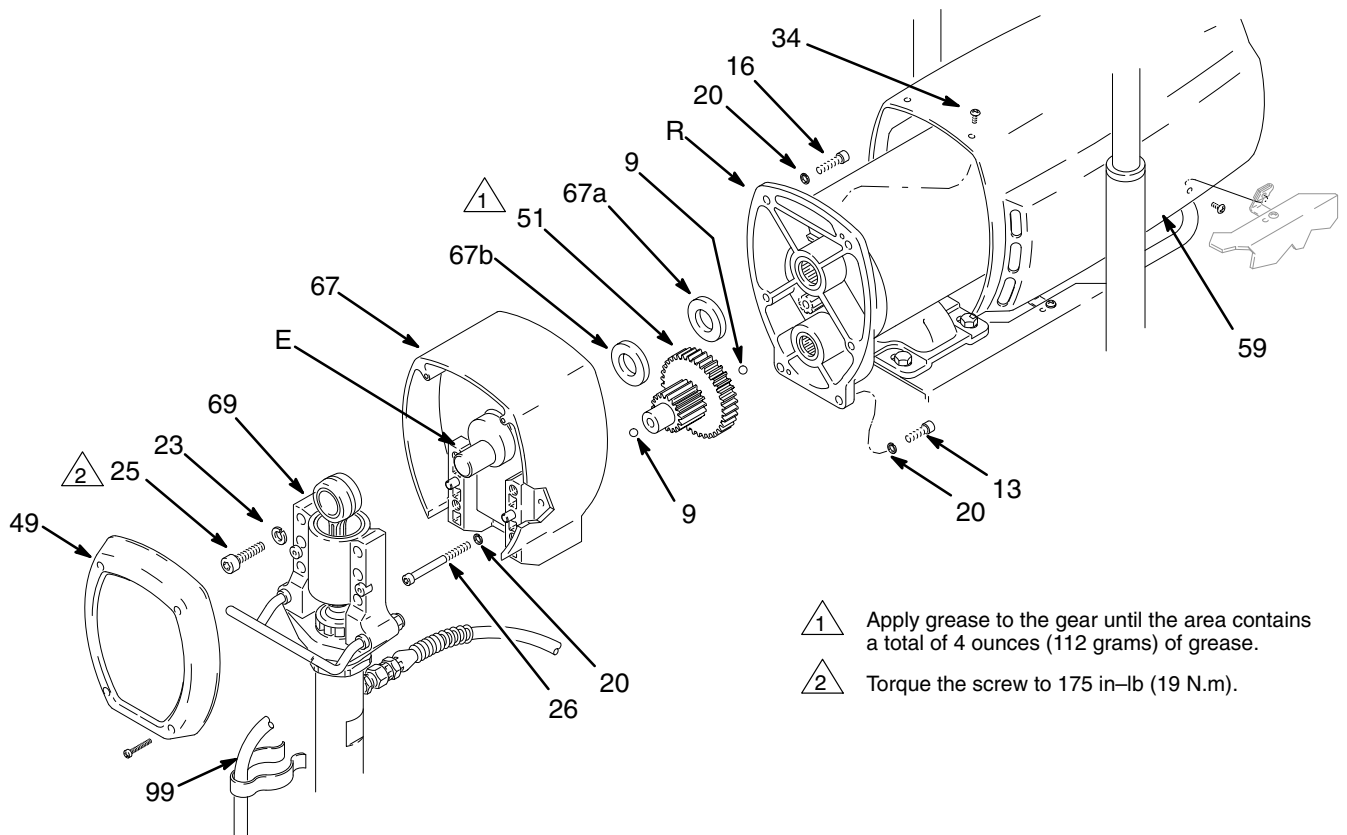


Fig. 24

03752

# Motor Replacement

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

**NOTE:** Refer to Fig. 27 for this procedure, except where noted otherwise.

1. Relieve the pressure.
2. Remove the shield (59).
3. Remove the cover (63) from the pressure control. Disconnect the four motor leads (A). See Fig. 25.

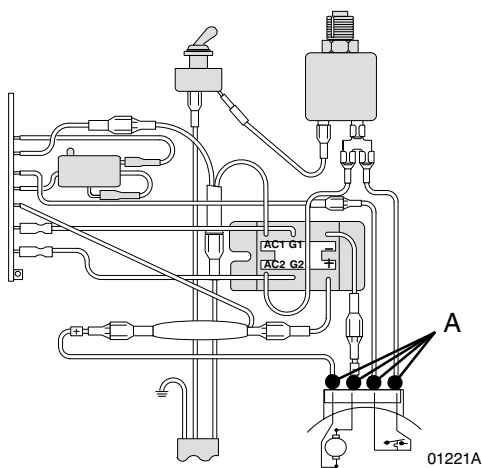


Fig. 25

4. Loosen the nut (345) at the pressure control (75).
5. Swing the conduit (1) away from the elbow (31).
6. Remove the seal (29) from around the elbow coming into the pressure control. Pull the electrical leads through the elbow, one at a time.

## CAUTION

Always pull the motor leads one at a time to avoid loosening the terminals, which could result in a bad connection and poor sprayer performance.

7. Loosen the nut (31) at the motor. Pull the conduit (1) away from the motor. Pull the electrical leads through the conduit, one at a time.
8. Unscrew the elbow from the motor.
9. Pull the wires through the elbow, one at a time.
10. Remove the cover (49) from the drive housing.
11. Remove the two screws (26).
12. Remove the two lower screws (13) and then remove the two upper screws (16) from the front of the motor (73).
13. Tap the drive housing (67) with a plastic mallet to loosen it from the front of the motor (73). Pull the drive housing straight off of the motor.

## CAUTION

Do not drop the gear (51) when removing the drive housing (67). The gear may stay engaged in the front of the motor or the drive housing.

Do not lose the balls (9) which are located at each end of the gear (51). Do not drop the balls between the gears. The balls, which are heavily covered with grease, usually stay in place, but could be dislodged. If the balls fall into the gears and are not removed, the balls will seriously damage the drive housing. If the balls are not in place, the bearings will wear prematurely.

14. Support the motor (75) to keep the sprayer from tipping. Remove the four screws (8). Lift off the motor.

# Motor Replacement

15. Install the new motor (75).
16. Apply high-quality bearing grease to the gear (51) until the area contains a total of 4 ounces (112 grams) of grease. Be sure the balls (9) are in place.
17. Place the bronze-colored washer (67b) and then the silver-colored washer (67a) on the shaft which protrudes from the big gear in the drive housing (67).
18. Align the gears and push the drive housing (67) straight on to the front of the motor and the locating pins.

19. Continue to reassemble the sprayer. Rotate the conduit (1) as you feed wires through the conduit. Install the seal (29) around the wires in the elbow (345) of the pressure control. The seal keeps contaminants from entering the conduit and the motor. See Fig. 26.

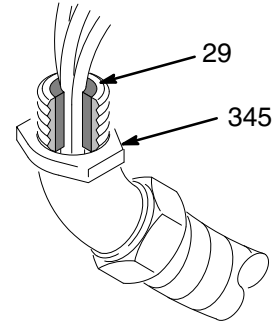


Fig. 26

01232

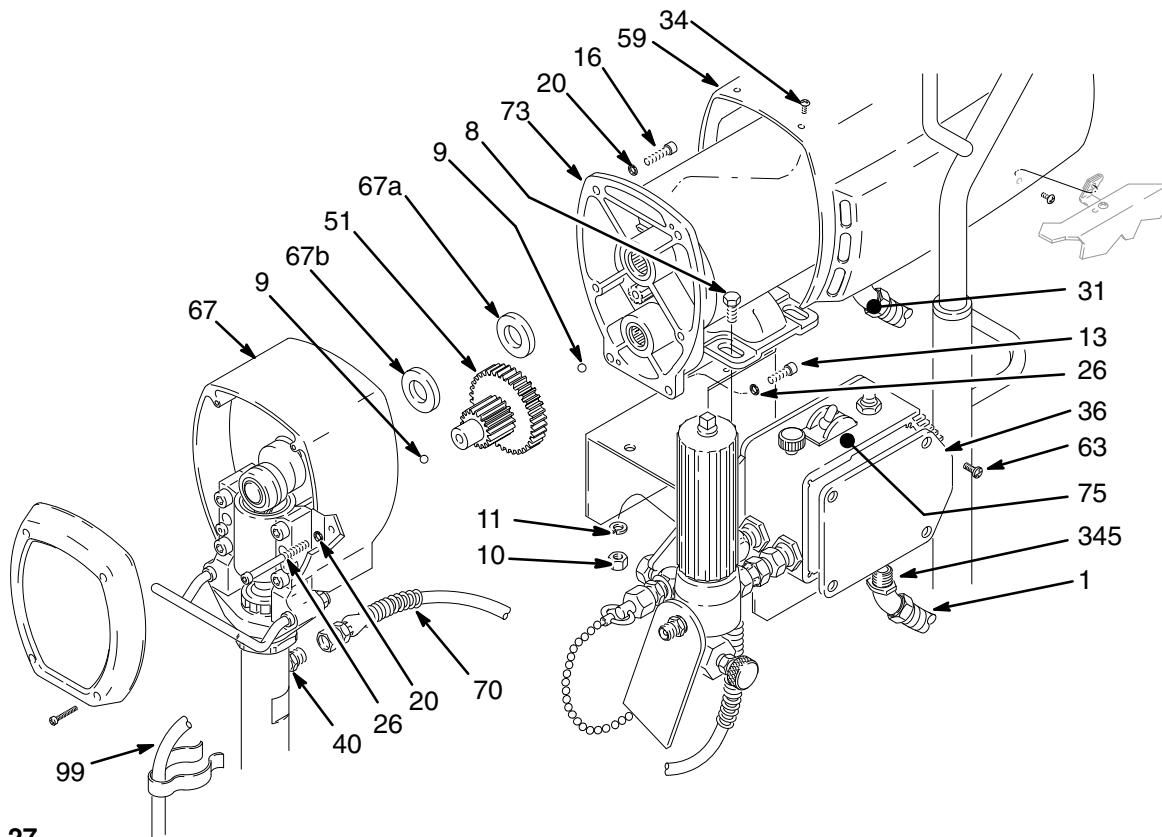


Fig. 27

01236A

# Removing and Installing a Pump

## WARNING

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve pressure.

## Remove the pump.

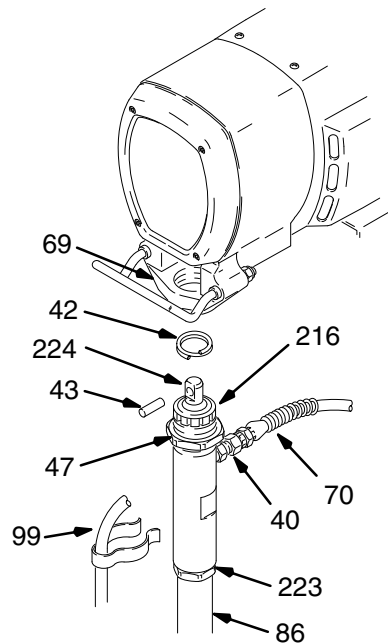


Fig. 28

04433

1. Flush the pump. Relieve the pressure. Stop the pump with the piston rod (224) in its lowest position or carefully rotate the blades of the fan with a screwdriver to lower the rod.
2. Hold the intake valve (223) steady with a wrench. Unscrew the suction tube (86).
3. Disconnect the hose (70).
4. Push up the spring (42). Push out the pin (43).
5. Loosen the locknut (47). Unscrew the pump from the bearing housing (69).

## Install the pump.

1. Screw the displacement pump three-fourths of the way into the bearing housing (69).

2. Hold the pin (43) up to the pin hole in the connecting rod assembly (68). Continue screwing in the pump until the pin slides easily into the hole. Back off the pump until the top threads of the pump cylinder are flush with the face (A) of the bearing housing and the outlet nipple (40) is facing straight back.
3. Push the spring (42) into the groove all the way around the connecting rod.
4. Torque the locknut (47) to 70 ft-lb (97 N.m), using a 2 inch open-end wrench and a light hammer.

## WARNING

Be sure the retaining spring (42) is firmly in the groove of the connecting rod, all the way around, to prevent it from working loose due to vibration.

If the pin works loose, parts could break off due to the force of the pumping action. These parts could be propelled through the air and result in a serious injury, sprayer damage or property damage.

## CAUTION

If the locknut (47) loosens during operation, the threads of the bearing housing (69) will be damaged. Be sure to tighten the locknut firmly.

5. Tighten the packing nut (216) just enough to stop leakage, but no tighter. Fill the wet-cup/packing nut 1/3 full with Graco TSL. See Fig. 29.



Torque the nut to 70 ft-lb (95 N.m).

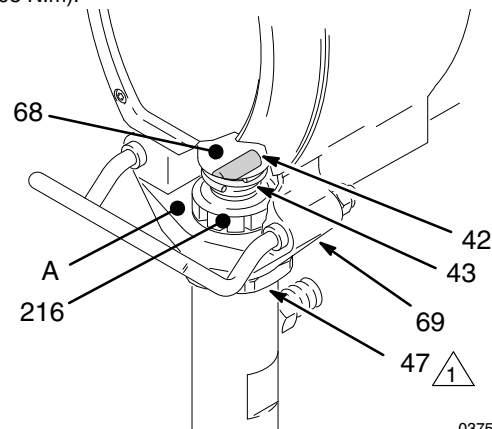


Fig. 29

03750

# Displacement Pump Repair

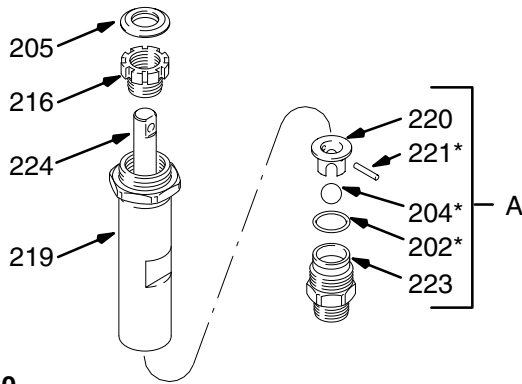


Fig. 30 04230

**NOTE:** Use the Packing Repair Kit, Part No. 222–588. An asterisk following a reference number indicates that the part included in the kit. For the best results, use all of the parts in the kit, even if the old parts still look good.

**NOTE:** Clean and inspect the parts after disassembling the pump. Replace the worn or damaged parts.

**WARNING**

To reduce the risk of a serious injury, follow the **Pressure Relief Procedure** on page 4 whenever you are instructed to relieve the pressure.

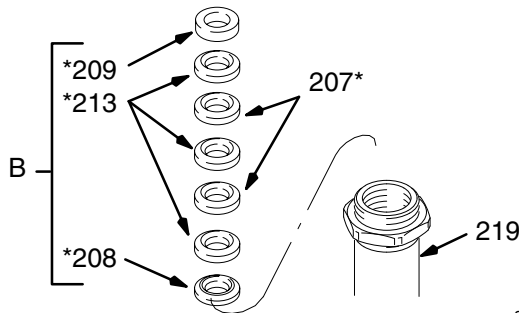


Fig. 31 04231

## Disassemble the Pump.

1. Relieve the pressure.
2. Remove the pump. See page 36.
3. Unscrew the intake valve assembly (A) from the cylinder (219). Remove all of the parts. See Fig. 30.
4. If no further service is needed, reassemble the intake valve assembly. Use a new gasket (202\*).
5. Remove the packing nut (216) and the plug (205). See Fig. 30.
6. Use a plastic mallet to tap the piston rod (224) down. Pull the rod out from the bottom of the cylinder (219). See Fig. 30.
7. Remove the throat packings and the glands (B). See Fig. 31.
8. Clamp the flats of the piston rod (224) in a vise. Loosen the nut (211). Unscrew the piston valve (222) from the rod. Remove all the parts from the piston assembly (C). See Fig. 32.
9. Remove the sleeve (218), using the sleeve removal tool, Part No. 222–586. Clean the sleeve and the cylinder.

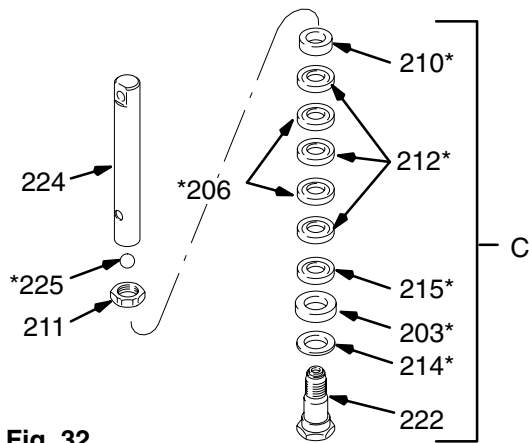


Fig. 32 04232

**WARNING**

Always use the special sleeve removal tool, Part No. 222–586, to remove the sleeve. Other tools or methods could cause the pump to rupture, resulting in serious injury. If the sleeve cannot be removed easily, return the sleeve and the cylinder to your Graco distributor for removal.

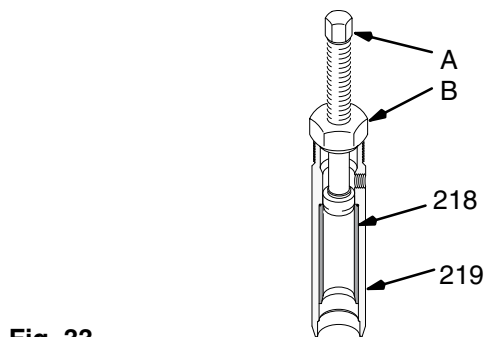


Fig. 33 0022

10. Screw the large nut (B) of the tool in to the top of the cylinder (19). Screw down the rod (A) to push the sleeve out of the cylinder. Remove the tool. See Fig. 33.

# Displacement Pump Repair

## Reassemble the Pump.

### NOTES:

- Install the leather and plastic packings exactly as indicated and as shown in Figures 34 and 38. Incorrect installation causes the pump to leak and may damage the packings.
  - Clean and inspect all sides of the parts. Replace any parts that are worn or damaged. Those parts will not seal properly with new parts.
  - Soak the leather packings in oil before using them.
1. Stack the backup washer (214), the seal (203\*), and the female gland (215\*) on the piston valve (222). Alternately stack the packings (212\*, 206\*), and then male gland (210\*) on the piston valve (222). See Fig. 34.

2. Tighten the nut (211) against the piston valve (222). Torque the nut to 19 ft-lb (27 N.m).

**Note the alignment** of the piston (222) to the nut (211). Maintain this alignment through Step 7.

3. Place the ball (225) on the piston valve (222). See Fig. 34.

### CAUTION

Step 4 is critical. Follow the procedure carefully to avoid damaging the packings by overtightening.

4. Apply one drop of adhesive, supplied, to the threads of the piston valve assembly. Hand tighten the assembly in to the piston rod just until the nut (211) makes contact with the rod (224). See Fig. 34.

- 1 Torque the nut to 10.5 in-lb (1.2 n.m) to seat the packing. Loosen the nut and then lightly retighten.
- 2 Apply one drop of sealant to these threads.
- 3 The lips of the V-packings must face up.
- 4 The lips of the U-cup packing must face down.

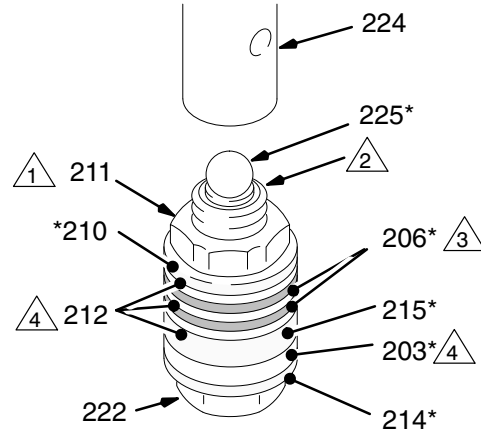


Fig. 34 03178

5. Place the flats of the piston rod in a vise.
6. Use a wrench to carefully tighten the nut (211) on to the piston rod. Torque the nut to 19 ft-lb (25 N.m). See Fig. 35.
7. Use two wrenches to maintain the alignment mentioned in Step 7, above.

- 1 Torque the nut against the rod to 19 ft-lb (27 N.m).
- 2 Do not allow the nut to move when installing the piston valve assembly on to the rod.

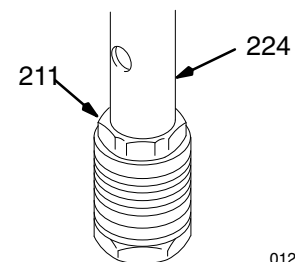


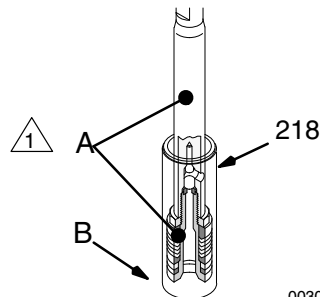
Fig. 35 01238

# Displacement Pump Repair

8. Stack the glands and packings in the top of the cylinder (219). Be sure to alternate the leather (207\*) and plastic (213) v-packings and stack the v-packings so the lips face down. See Fig. 38.
9. Install the packing nut (216) and the plug (205), but leave the nut loose for now. See Fig. 38.
10. Oil the piston rod and the packings. Carefully slide the assembly (A) **into the top of the sleeve (218)**.

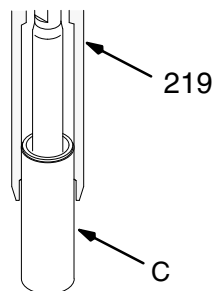
**NOTE:** The tapered end (B) of the sleeve (218) is the bottom of it. See Fig. 36.

1 Oil the piston rod and the packings.



**Fig. 36** \_\_\_\_\_ 0030

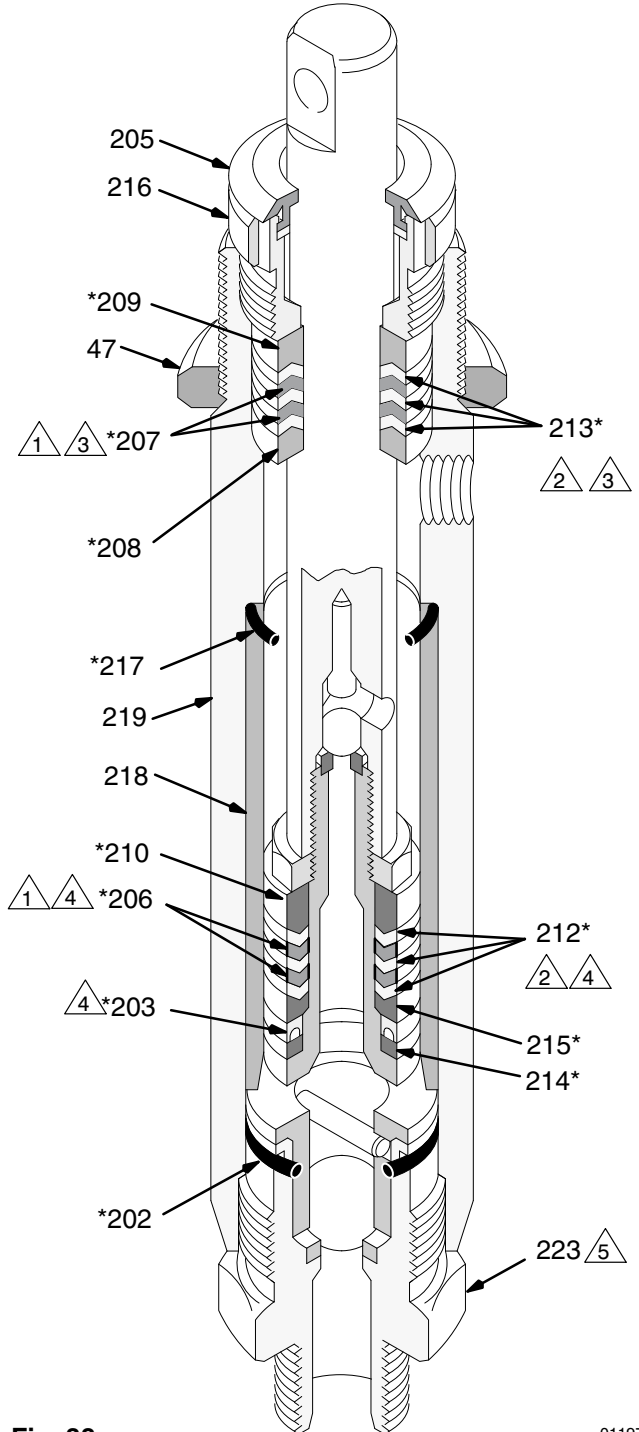
11. Place a new o-ring (217\*) firmly in the cylinder groove. See Fig. 38.
12. Slide the sleeve and piston rod assembly (C) **into the bottom of the cylinder (219)**. This is to prevent packing damage during reassembly. See Fig. 36.



**Fig. 37** \_\_\_\_\_

13. Screw down the cylinder locknut (47) until it is finger tight at the bottom of the external cylinder threads.
14. Place the flats of the intake valve (223) in a vise. Install a new o-ring (202\*). Screw the pump cylinder into the valve. Torque to 70 ft-lb (95 N.m). See Fig. 38.
15. Install the pump.

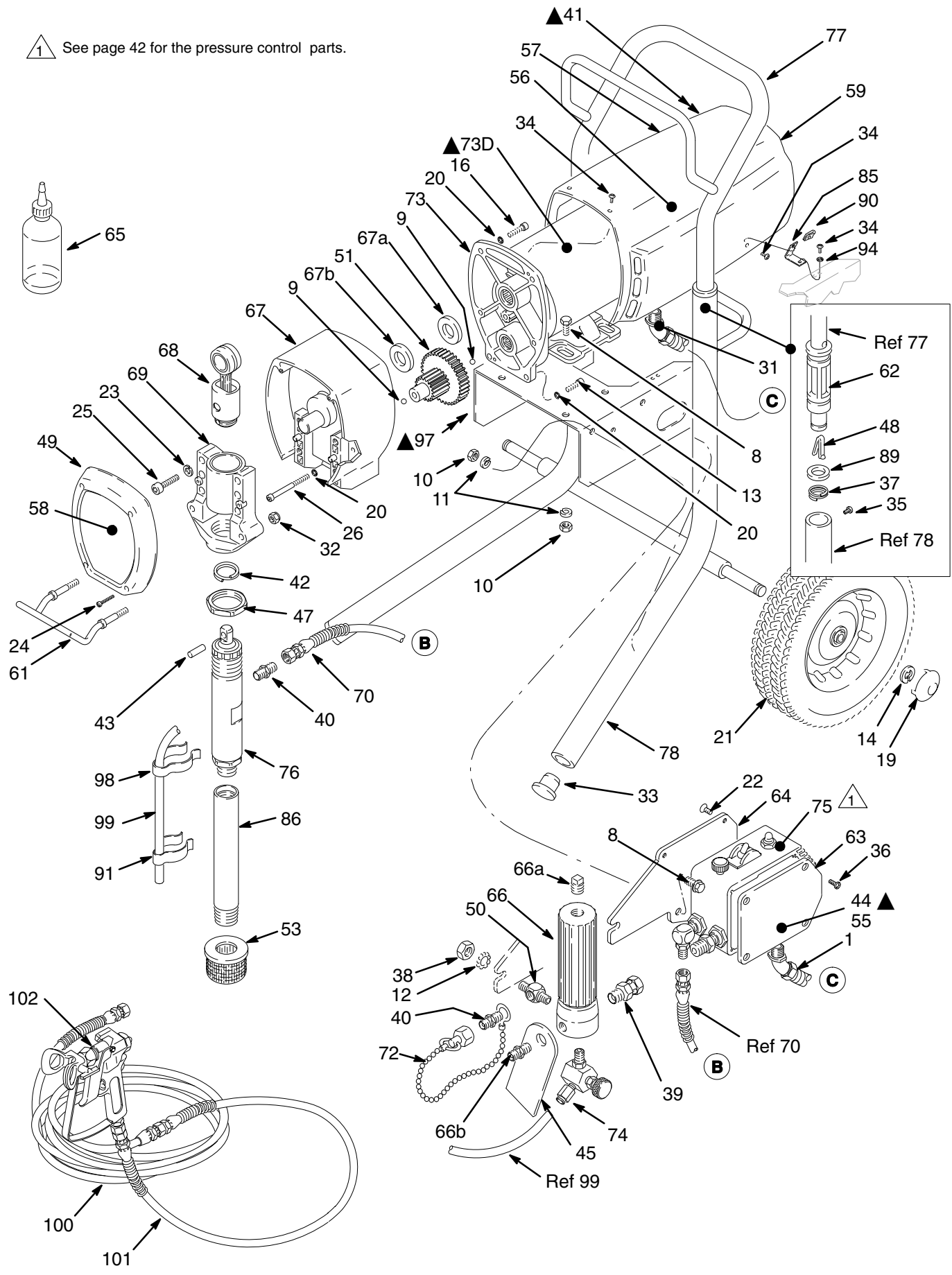
- 1 Leather packings.
- 2 Poly packings.
- 3 The lips of these packings must face down.
- 4 The lips of these packings must face up.
- 5 Torque the intake valve to 70 ft-lb (95 N.m).



**Fig. 38** \_\_\_\_\_ 01197

# Parts – Upright Sprayer

1 See page 42 for the pressure control parts.





# Parts – Upright Sprayer

## Model 231–034, Series D

Includes items 1 – 99  
Basic Sprayer

Ref No.	Part No.	Description	Qty
1	065–099	ELECTRICAL CONDUIT <i>specify length when ordering 0.8</i>	ft
8	110–963	SCREW, serrated flange, hex hd, 5/16–18 x 3/4"	7
9	100–069	BALL, 1/4" dia.	2
10	100–188	NUT, 5/16–18 unc–2a	7
11	100–214	LOCKWASHER, 5/16"	7
12	100–322	LOCKWASHER, 7/16"	1
13	100–643	SCREW, socket head, 1/4–20 x 1"	2
14	101–242	RETAINING RING	2
16	100–644	SCREW, socket head, 1/4–20 x 0.75"	2
17	101–754	PLUG <i>see page 42</i>	1
19	104–811	HUBCAP	2
20	105–510	LOCKWASHER, 1/4"	6
21	106–062	WHEEL	2
22	106–078	SCREW, oval head no. 6–24 x 3/8", type "c"	4
23	106–115	LOCKWASHER, spring, 3/8"	4
24	107–209	SCREW, filh, no. 8–32 x 1"	4
25	107–210	CAPSCREW, socket head, 3/8–16 x 1–1/2"	4
26	107–218	CAPSCREW, socket head, 1/4–20 x 2.75"	2
27	107–258	TIP, grip, <i>see page 42</i>	1
29	107–447	SEAL, <i>see page 42</i>	2
31	108–460	45° CONDUIT CONNECTOR	1
32	112–746	RETAINER NUT	2
33	108–691	PLUG	2
34	108–865	SCREW, pan head, no. 8 x 3/8"	10
35	109–032	SCREW, pan head, 10–32 x 1/4"	4
36	110–037	SCREW, pan head, 10–24 x 1/2"	4
37	110–243	RETAINING RING	2
38	150–513	NUT, 7/16"	1
39	155–665	SWIVEL UNION, 3/8" npsm swivel x 3/8 npt(m)	1
40	162–453	NIPPLE, 1/4 npt(m) x 1/4 npsm	2
41▲	185–952	LABEL, DANGER, English	1
42	176–817	RETAINING SPRING	1
43	176–818	PIN, headless, 0.3125" dia x 1.023"	1
44▲	177–762	LABEL, WARNING	1
45▲	178–034	TAG, WARNING	1
46▲	185–594	LABEL, WARNING	1
47	178–941	NUT	1
48	111–590	SNAP BUTTON	2
49	188–154	COVER	1
50	179–945	ELBOW, special, 1/4–18 npt (m x f)	1
51	179–961	GEAR REDUCER	1
52	180–041	PIN <i>see page 42</i>	1
53	187–147	STRAINER	1
55	181–608	LABEL, identification	1
56	181–639	LABEL, ID, motor cover, left	1
57	181–640	LABEL, ID, motor cover, right	1
58	181–641	LABEL, ID, front cover	1
59	223–095	SHIELD; <i>includes items 41, 46, 56, 57</i>	1
61	189–918	HANGER	1
62	187–603	SLEEVE	2
63	183–995	COVER	1

## Model 231–043, Series B

Includes items 1 – 102  
Complete Sprayer

Ref No.	Part No.	Description	Qty
64	183–365	BRACKET	1
65	206–994	THROAT SEAL LIQUID, 8 OZ	1
66	214–570	FLUID FILTER <i>Includes 66a and 66b see manual 307–273 for parts</i>	1
66a	100–040	.PLUG	1
66b	162–453	.NIPPLE, 1/4 npt(m) x 1/4 npsm	1
67	220–369	DRIVE HOUSING <i>includes replaceable items 67a and 67b</i>	1
67a	178–967	.WASHER, silver-colored	1
67b	107–089	.WASHER, bronze-colored	1
68	218–034	CONNECTING ROD	1
69	218–035	BEARING HOUSING <i>Includes items 32 and 61</i>	1
70	223–766	HOSE, grounded, nylon, 1/4" ID cpld 1/4 npsm (f), 29" (715 mm), spring guards both ends	1
71	218–405	CIRCUIT BOARD, 115V	1
72	220–285	CAP	1
73*	222–388	MOTOR, ELECTRIC <i>includes replaceable items 73a to 73d (which are shown on page 43) and one of item 9</i>	1
73a	107–267	.TERMINAL, female	2
73b	107–504	.TERMINAL, female	1
73c	103–885	.TERMINAL, wire, female, snap-on	1
73d▲	185–951	.LABEL, DANGER, English	1
74	222–198	PRESSURE DRAIN VALVE	1
75	220–455	PRESSURE CONTROL ASSY <i>see page 42 for parts</i>	1
76	222–580	DISPLACEMENT PUMP <i>see page 44 for parts</i>	1
77	222–554	HANDLE	1
78	222–555	CART <i>includes replaceable items 58 &amp; 76</i>	1
85	185–384	BRACKET	2
86	185–386	SUCTION TUBE	1
89	183–350	WASHER	2
90	110–240	SPEED NUT	2
91	181–102	CLIP	1
94	100–020	WASHER	2
97▲	185–955*	LABEL, DANGER, French	1
98	186–494	CLIP	1
99	186–495	DRAIN HOSE	1
100	223–541	HOSE, grounded, nylon, 1/4" ID, cpld 1/4 npsm(f), 50 ft (15 m) spring guards both ends	1
101	214–701	HOSE, grounded, nylon, 3/16" ID, cpld 1/4 npsm(f), 3 ft (.9 m), spring guards both ends	1
102	220–955	SPRAY GUN <i>see manual 307–614 for parts</i>	1

\* These parts are also included in the Motor Brush Repair Kit, 220–853, which may be purchased separately.

▲ Replacement Danger and Warning labels, tags and cards are available at no cost.

# Parts – Pressure Control

## Pressure Control Assembly 220–455

Includes all items listed below, except the terminals.

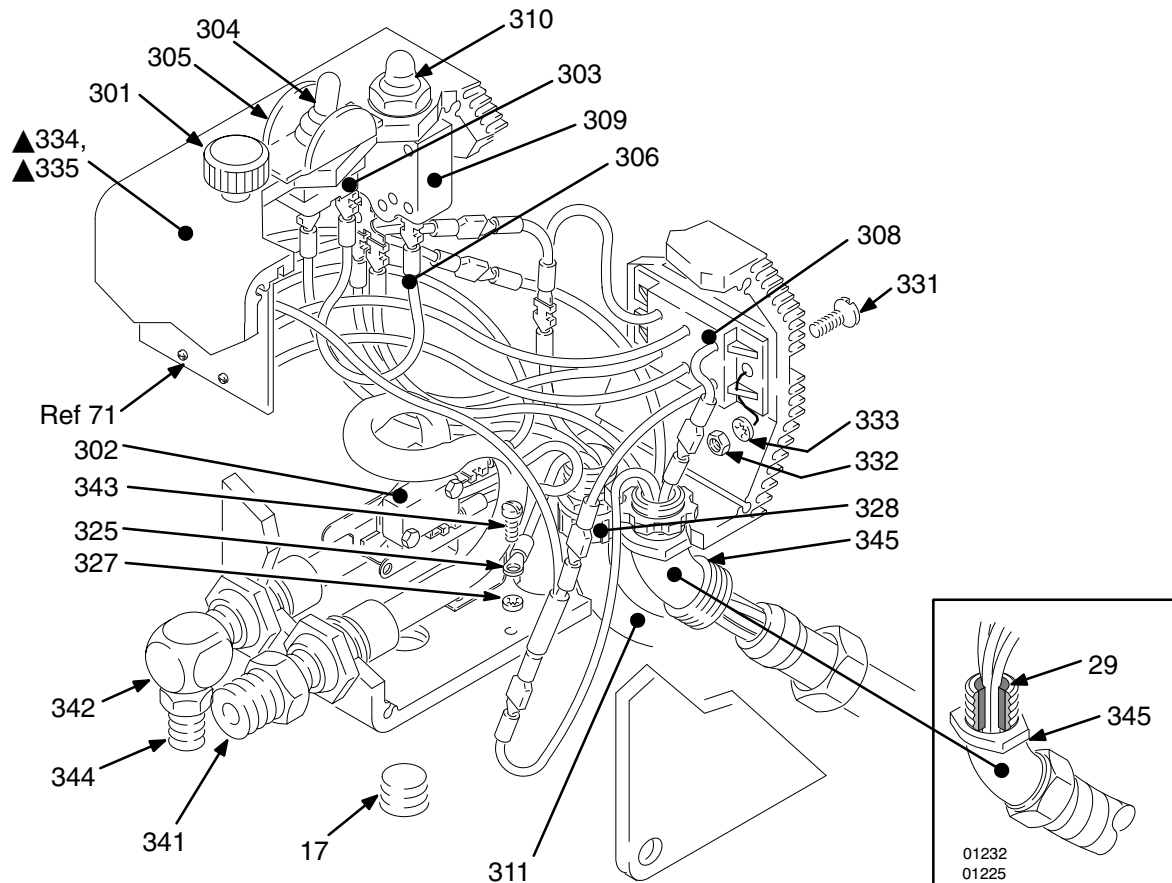
The terminals are included with the circuit board (item 71).

The terminals listed in this parts list are shown on the wiring diagram on page 43.

Part numbers for items 17, 27, 29, 52, 71, 73a, 73b and 73c are shown in the drawings below and on page are given on page 41.

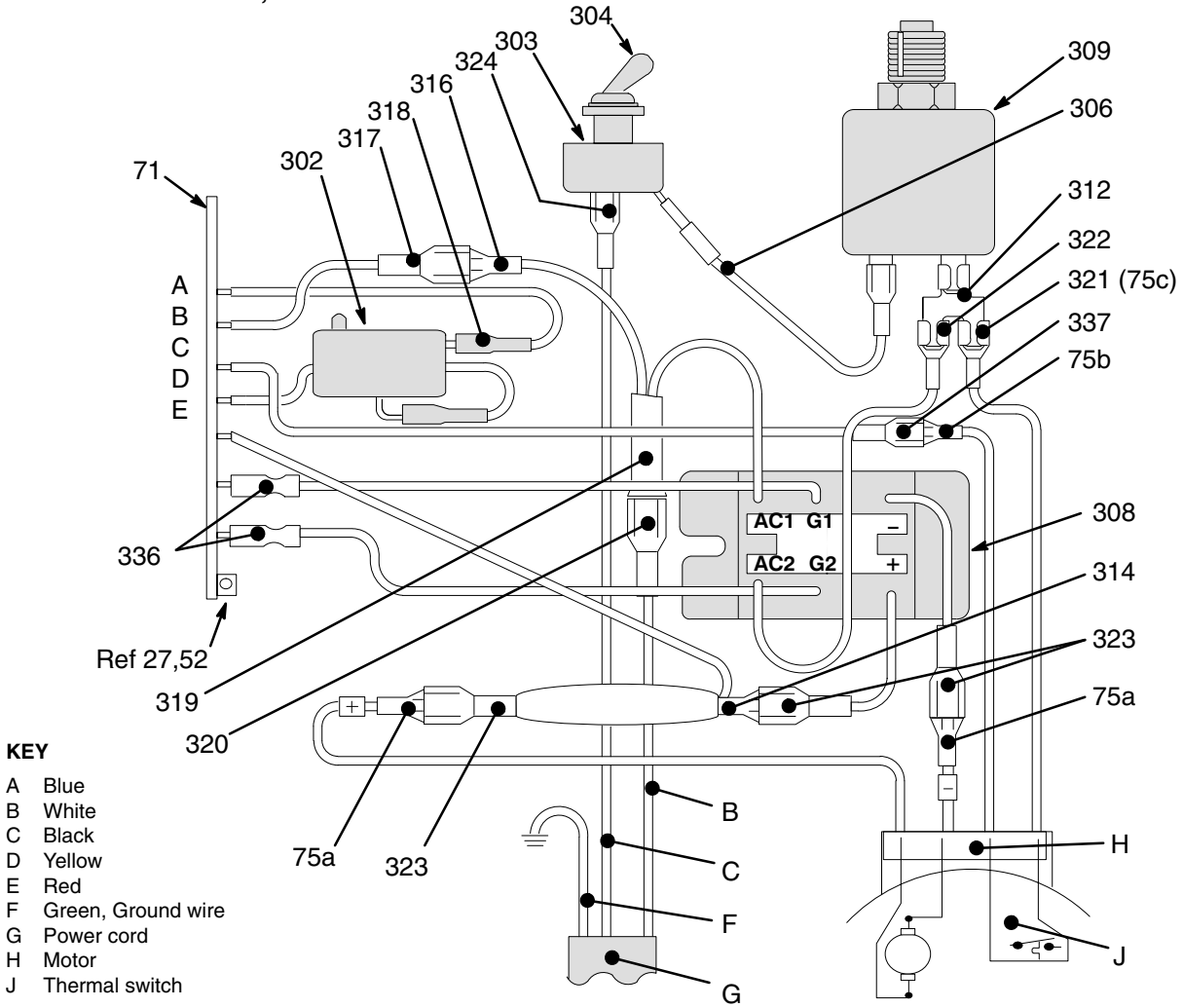
Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
302	180-043	MICROSWITCH	1	325	102-799	RING TERMINAL	1
303	105-679	ON/OFF SWITCH	1	327	157-021	LOCKWASHER, no. 8	1
304	105-659	BOOT	1	328	108-295	STRAIN RELIEF BUSHING	1
305	107-255	GUARD	1	331	101-273	SCREW, flat hd, no. 10-24 x 5/8"	2
306	218-168	JUMPER WIRE	1	332	100-179	NUT, hex, no. 10-24 thd	2
308	218-170	RECTIFIER	1	333	100-718	LOCKWASHER, no. 10	2
309	107-256	CIRCUIT BREAKER	1	334▲	178-797	LABEL, WARNING	1
310	107-254	BOOT	1	335▲	178-035	LABEL, WARNING	1
311	218-169	POWER CORD	1	336	107-261	TERMINAL, male	2
312	107-268	TERMINAL ADAPTER	1	337	107-503	TERMINAL, female	1
314	107-267	TERMINAL, female	1	338	107-504	TERMINAL, male	1
315	107-293	TERMINAL, female	2	341	157-350	ADAPTER, 3/8 npt(m) x 1/4 npt (m)	1
316	107-264	TERMINAL, male	1	342	100-840	ELBOW, 1/4 npt(m x f)	1
317	107-396	TERMINAL, male	1	343	100-035	SCREW, slotted pan hd, no. 8 x 5/16"	1
318	107-262	TERMINAL, female	1	344	162-453	NIPPLE, 1/4 npt(m) x 1/4 npsm	1
319	107-260	TERMINAL, female	1	345	108-460	CONDUIT CONNECTOR	1
320	107-266	TERMINAL, female	1				
321	103-885	TERMINAL, male	1				
322	103-886	TERMINAL, female	3				
323	107-265	TERMINAL, female	1				
324	107-263	TERMINAL, female	1				

▲ Replacement Danger and Warning labels, tags and cards are available at no cost.



# Parts – Wiring Diagram

Circuit Board 218–405, 5 Wires



**KEY**

- A Blue
- B White
- C Black
- D Yellow
- E Red
- F Green, Ground wire
- G Power cord
- H Motor
- J Thermal switch

01221

# Parts – Displacement Pump

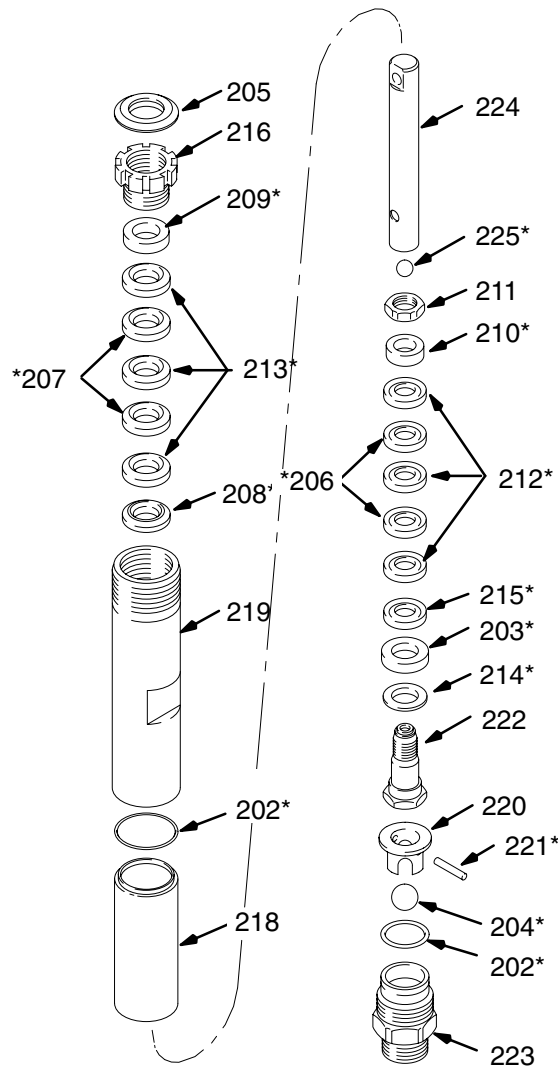
## Model 222–580, Series A

Includes items 202 to 225

Ref No.	Part No.	Description	Qty
202*	110–165	PACKING, PTFE ®	2
203*	107–093	U–CUP SEAL, polyurethane	1
204*	105–445	BALL	1
205	179–810	PLUG 1	
206*	178–939	V–PACKING, leather	2
207*	178–940	V–PACKING, leather	2
208*	178–942	GLAND, male	1
209*	178–943	GLAND, female	1
210*	178–944	GLAND, male	1
211	178–945	NUT, hex,	1
212*	178–964	V–PACKING, plastic	3
213*	178–965	V–PACKING, plastic	3
214*	181–338	BACKUP WASHER	1
215*	178–969	GLAND, female	1
216	179–809	PACKING NUT	1
218	185–213	SLEEVE	1
219	185–211	CYLINDER	1
220	185–214	BALL GUIDE	1
221*	178–938	PIN 1	
222	218–036	PISTON VALVE	1
223	222–437	INTAKE VALVE	1
224	222–438	PISTON ROD	1
225*	105–444	BALL	1

\* These parts are also included in Repair Kit 222–588, which may be purchased separately. Keep a repair kit on hand to reduce down time.

**NOTE:** A sleeve removal tool, Part No. 222–586, which is for use only with pump 222–580, is required for removing the sleeve from the cylinder. Purchase the tool separately.



01198





# Technical Data

Power Requirements	120 VAC, 60Hz, 1 phase, 15 amp minimum or 3500 Watt generator
Motor	1 hp, DC
Working Pressure Range	0–3000 psi (0 – 210 bar)
Cycles/Gallon (liter)	200 (53)
Maximum Delivery	1.0 gpm (3.8 liter/min)
Tip Size	one gun – 0.031; two guns – 0.019 (with latex at 2000 psi (138 bar))
Power Cord	No. 14 awg, 3 wire, 8.5 feet (2.6 m)
Inlet Paint Strainer	16 mesh (1190 micron), stainless steel screen, reusable
Outlet Paint Filter	60 mesh (250 micron), stainless steel screen, reusable
Pump Inlet Size	3/4 npt(m) with 30° ID chamfer
Fluid Outlet Size	1/4 npsm from fluid filter
Wetted Parts:	
<i>Displacement Pump</i>	Carbon steel, polyurethane, Delrin®
<i>Packing Material</i>	Leather, UHMW polyethylene
<i>Filter</i>	Aluminum, carbon steel, stainless steel 60 mesh (250 micron reusable stainless steel screen)

**NOTE:** Delrin®

## Dimensions

Weight (dry w/o packaging)	95 lb (43 Kg)
Height	28 in. (711 mm)
Length	26 in. (660 mm)
Width	22.5 in. (572 mm)

## Graco Phone Numbers

***TO PLACE AN ORDER***, contact your Graco distributor, or call this number to identify the distributor closest to you: **1-800-367-4023 Toll Free**

***FOR TECHNICAL ASSISTANCE***, service repair information or assistance regarding the application of Graco equipment: **1-800-543-0339 Toll Free**

# Manual Change Summary

The bearing housing on the Upright Sprayers has changed in appearance, but the part number has not changed. The change in appearance resulted in a change to the pail hanger which is itemized in the chart to the right.

Assembly	Part Status	Ref	Part No.	Name
231-034 and 231-043 Sprayers	Delete	32	110-814	Nut
		60	183-035	Bracket
		61	186-277	Hanger
	Add	32	112-746	Nut
		61	189-918	Hanger
	Old New	46	178-934	Label
		46	185-954	Label
	Old New	49	179-899	Cover
		49	188-454	Cover
	Old New	70	223-766	Hose
		235-574	Hose	

## The Graco Warranty and Disclaimers

### WARRANTY

Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the Ultra equipment proven defective, with the exception of defects in parts on the drive train/gear box, which will be repaired or replaced for forty-eight months from the date of sale and the electric motor (excluding brush replacement, which is routine maintenance) or pressure control assembly which will be repaired or replaced for twenty-four months from the date of sale. 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, 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 with Graco equipment of 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 claim. 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.

### DISCLAIMERS AND LIMITATIONS

The terms of this warranty constitute purchaser's sole and exclusive remedy and are in lieu of any other warranties (express or implied), **including warranty of merchantability or warranty of fitness for a particular purpose**, and of any non-contractual liabilities, including product liabilities, based on negligence or strict liability. Every form of liability for direct, special or consequential damages or loss is expressly excluded and denied. In no case shall Graco's liability exceed the amount of the purchase price. Any action for breach of warranty must be brought within two (2) years of the date of sale.

### EQUIPMENT NOT COVERED BY GRACO WARRANTY

Graco makes no warranty, and disclaims all implied **warranties of merchantability and fitness for a particular purpose**, with respect to accessories, equipment, materials, or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motor, 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.

**Sales Offices:** Atlanta, Chicago, Dallas, Detroit, Los Angeles, Mt. Arlington (N.J.)  
**Foreign Offices:** Canada; England; Korea; Switzerland; France; Germany; Hong Kong; Japan

**GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440-1441**

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