# **INSTRUCTIONS - PARTS LIST**



6000206 Rev E

This manual contains IMPORTANT WARNINGS and INSTRUCTIONS READ AND RETAIN FOR REFERENCE

## Air-Powered Premier Variable Ratio Hydra-Cat® Proportioning Pump

100 PSI (6.8 bar) Maximum Working Air Pressure 5000 PSI (340 bar) Maximum Working Fluid Pressure

Model : SWO-B00085

# CE

## WARNING

#### MOVING PARTS HAZARD

Relieve fluid and air pressure to unit before servicing unit. Do not operate with panels removed. Frame Closes suddenly when pivot pins are removed. Keep Clear of Frame when operating unit.



#### WARNING

Graco does not manufacture or supply any of the reactive chemical components that are used in this equipment and is not responsible for their effects. Because of the vast number of chemicals that could be used and their varying chemical reactions, the buyer and user of this equipment should determine all factors relating to the fluids used , including any of the potential hazards involved. Particular inquiry and investigation should be made into potential dangers relating to toxic fumes, fires explosions, reaction times, and exposure of human beings to the individual components or their resultant mixtures. Graco assumes no responsibility for loss, damage, expense or claims for bodily injury or property damage, direct or consequential, arising from the use of such chemical components.

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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 you skin and into you 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.

If using a high pressure airless spray gun, have the tip guard in place when spraying.

ALWAYS FOLLOW THE Pressure Relief Procedure, below, before e 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 or dispensing Valve Safety Devices

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

#### Safety Latch (if so equipped)

Whenever you stop spraying, even for a moment, always set the gun safety latch 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 (on spray guns only)

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, right, 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 (on spray guns only)

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.

#### Spray Tip and Nozzle Safety

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 and Nozzle Safety

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

NEVER wipe off build-up around the spray tip/nozzle until pressure is fully relieved and the gun safety latch is engaged.

#### 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 spry/dispensing system, when installing, cleaning or changing spray tips/nozzles, and whenever you stop spraying/dispensing.

- 1. Engage the gun safety latch.
- 2. Shut off the power to the motor.
- 3. Close the bleed-type master air valve (required in your system).
- Disengage the gun safety latch. Hold a metal part of the gun firmly to the side of a grounded metal pal, and trigger the gun to relieve pressure.
- 5. Engage the gun safety latch.
- 6. Open the fluid drain valve (required in your system), 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 en coupling to relieve pressure gradually, the loosen completely. Now clear the tip or hose.

## EQUIPMENT MISUSE HAZARD

#### **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 would 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.

## HOSE SAFETY

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 fluid 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 or allow high pressure spray to be emitted from the coupling.

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.

## FIRE OR EXPLOSION HAZARD

Static electricity is created by the flow of fluid through the pump and the 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 fire or explosion and serious bodily injury and property damage.

#### **System Pressure**

All system components must meet or exceed the pressure ratings printed on the pressure relief valve. The lever amplification of the secondary pump enables very high fluid pressures to be achieved. A 5000 PSI (340 bar) working pressure range relieve valve is provided on the secondary side to limit the fluid pressure. Do not tamper with this pressure relief valve or serious bodily injury could result.

#### Fluid and Solvent Compatibility

All chemicals used in the sprayer must be chemically compatible with the wetted parts shown in the TECHNICAL DATA on back page. Consult your chemical supplier to ensure compatibility.

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  $180^{\circ}F$  ( $82^{\circ}C$ ) or below -  $40^{\circ}F$  (- $40^{\circ}C$ ).

#### **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 of 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**.

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. Pump: Use a ground wire and clamp. See Fig 1.
- 2. *Fluid hoses:* Use only grounded hoses with a maximum of 500' (150 m) combined hose length to ensure grounding continuity. See **Hose Grounding Continuity** on previous page.
- 3. *Air compressor:* Follow the manufacturer's recommendations.
- 4. *Spray gun:* Obtain grounding through connection to a properly grounded fluid hose and sprayer.
- 5. *Object being sprayed:* According to local code.
- 6. Fluid supply container: According to local code.
- 7. 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.
- 8. 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.

#### To Ground the Pump:

## **MOVING PARTS HAZARD**

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**  Loosen the grounding lug locknut (W) and washer (X). Insert one end of a 1.5 mm<sup>2</sup> (12 ga) minimum ground wire (Y) into the slot in lug (Z) and tighten the lockrut securely. See Fig 1. Connect the other end of the wire to a true earth ground. Use Part No. 237-569 which is part of the assembly.



#### Flushing Safety

Reduce the risk of fluid injury, static sparking, or splashing by following the Pressure Relief Procedure on page 2, and removing 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.

**Procedure** on page 2 before checking or servicing any part of the sprayer, to prevent it from starting accidentally.

## **Definition of Terms**

**WARNING:** Alerts user to avoid or correct conditions which could cause serious bodily injury.

**CAUTION:** Alerts user to avoid or correct conditions which could damage or destroy equipment.

NOTE: Identifies essential procedures or information.

**VRHC:** An abbreviation for Variable Ratio Hydra-Cat Pump. this system automatically proportions and mixes two fluids in a prescribed ratio, which is variable within the ranges listed on the cover of this manual.

**BASE:** also called polyol or resin, is one of two reactive chemicals used in a plural component system.

## **Specifications**

The following chart gives specification for the pumps using No. 10 weight oil. The volumetric ratio is expressed as the proportions of the volume of fluid of the primary pump compared to the volume of fluid of the secondary pump.

			Configuration		At Minimum Ratio Setting				At maximum Ratio Setting						
Assembly	Master	Slave	Moto	Master	Slave	Ratio	Stall	Stall	Output	Output	Ratio	Stall	Stall	Output	Output
Part#			r CM <sup>2</sup>	CM <sup>2</sup>	CM <sup>2</sup>		PSI	Bar	GPM	LPM		PSI	Bar	GPM	LPM
SWO-B00085	244-422	244-420	800	12	6	2.00	4444	296	4.38	16.56	6.00	5714	381	3.40	12.88

**REDUCER:** Also called true solvent or diluent, is used to thin the base.

**CATALYST:** Also called hardener or activator, is the fluid which reacts with the base fluid.

**PART:** An undefined unit of measurement. When you determine the size of the unit (ounce, pint, gallon), use that measurement consistently in setting up your system.

## Installation

The Typical Installation in Fig. 2 and 3 are only guidelines to setting up the complete VRHC system. Two types of applicatins are shown: an airless spray dispensing system for spraying light viscosity fluids, and

a dipensing system for medium viscosity fluids. For assistance in desighning a system to suit your particular needs, contact your Graco distirbutor.



# Installation

#### Location

Set the proportioner on a flat floor position.

#### **Connect the Fluid Supply Lines**

Connect grounded fluid hoses to the 3/4" NPT(F) pump inlet fittings (R,T). If the unit will be pressure fed from separate supply pumps, install a fluid pressure gauge at each inlet.

**NOTE:** Pressurezed Fluid supplies must not exceed 1/4 the operating fluid pressure of the pump. Pressure above that level will feed through the pump and improper proportioning will result.

#### **System Accessories**

If hoses and dispensing equipment are supplied by others. Make sure the components are compatible to the pressure and volume requirements.

**Note:** To ensure maximum pump performance, be sure all accessories are properly sized to meet your system requirements.

In the air line, install and air filter (L) to remove harmfull dirt and moisture from the compressed air supply. Downstream from the air filter, the air regulator (13) and the bleed-type master air valve (45), install an air line lubricator (M) to provide automatic lubrication to the motor.

- WARNING -

The bleed-type master air valve (45) is required in your system to relieve air trapped between the valve and he pump after the pump is shut-off. Trapped air can cause the pump to cycle unexpectedly, resulting in serie bodily injury, including amputation.

#### **Connect the Air Supply line**

Connect a grounded air supply hose to the inlet port of the air manifold (37). Open the bleed-type master air valve (45), and using the pressure gauge (8), set the air regulator (13) to the desired pressure. See Figures 2 and 3 and the drawing.

#### **Pressure Relief Valve**

Before operating the VRHC, make sure all component have the proper rated working pressures. For more information about the pressure relief valve, see Instruction manual 308-547.

#### Grounding

Ground the pump and all other system components as instructed in **FIRE AND EXPLOSION HAZARD** on page 3.

## **Ratio Adjustement**

Understanding the terms used with **the Variable Ratio Hydra-CatÒ(VRHC) system**, how it functions, and how to find and set the correct ratio(s) for your application, is the key to easier, more versatile operation of your proportional system.

Be sure to read and understand the following information before operating the equipement.

#### Terms

The **ratio** refers to the simultaneous output of a certain volume of fluid by the primary and secondary pumps.

The **primary pump** is directly under the air motor; it usually pumps the base fluid.

The **secondary pump** is on the opposite end of the lever arm. it usually pumps the catalys.

# There are three main points to remember when applying the use of ratios :

- 1. Determine the ratio required
- 2. Refer to assembly drawing on frame
- Set the ratio on the VRHC system by turning the ratio adjustment screw. The scale located on the front panel indicates the ratio. Refer to frame drawing 965-472, Item 44 Nut and 21 Rod Adjusting.

## Setting the ratio

#### WARNING

o reduce the risk of serious injury whenever you are nstructed to relieve pressure, always follow the **ressure Felief Porcedure** on page 2.

#### 1. Relieve the pressure.

2. Flusch the unit as instructed on page 15 before setting the pump.

- 3. Unscrew locking nut (ref. 44, drawing 965472) to relieve leveradjustment screw.
- 4. Turn the adjustment screw (ref. 21, drawing 965472) to change the ratio. The pointer at the ratio scale on the front cover of the unit gives an indication of the ratio setting.
- 5. Tighten the locknut (ref. 44, drawing 965472) to fix the ratio setting.
- 6. Check the ratio as described on page 11. Repeat steps 1 to 5 if the ratio is not correct en recheck it.

# Operation

The pumps and other components were tested with lightweight oil at the factory. Before operating the pump, thourougly flush the VRHC to prevent contamination of the fluids.

#### **System Flushing**

NOTE: Flush the mixer, hose and gun often enough to prevent fluid from reacting or curing in them. contact your fluid manufacturer for the effective pot life of the fluid you are using.

- 1. Put the pump intake hoses into a 5 gallon (20 liter) container of compatible solvent. Refer to the paint manufacturer's recommendations.
- 2. Start the pump as explained below.
- 3. Do not install the spray tip yet. Hold a metal part of the gun firmly to the side of a grounded metal pail. Using the lowest possible fluid pressure, trigger the gun into the pail.
- 4. When clean solvent comes from the gun, release the trigger and carefully check all connections in the system for leaks.

5. Take the hoses out of the solvent and trigger the gun until all solvent has been pumped out of the hoses.

#### Starting the Pump

- 1. Close the bleed-type master air valve. Turn the air regulator knob all the way out (counterclockwies).
- 2. Turn on the main air supply.
- Open the mixer manifold handle, trigger the gun, slowly open the bleed-type master air valve, and turn the air regulator knob clockwise until the pump starts.
- Allow the pump to cycle slowly until all the air is pushed out of the lines. Release the trigger - the pump will stall against the pressure.
- 5. The manifold handle controls fluid flow. When the maifold is open, base and catalyst are supplied to the gun. To stop the flow, close the handle.



Fig. 4

# Operation

NOTE: To open the mixer manifold put the handle in the down positions. To close the mixer manifold, put the handle in the up position. See Fig. 4 on page 10.

#### **Standard Operating Flushing**

- 1. Use the solvent valve to flush contaminants and mixed fluid from the mixer manifold, hose and gun. Follow the procedure below.
  - a) Start the solvent pump. Close the mixer manifold.
  - b) Open the solvent valve.
  - c) Trigger the gun into the metal pail until the valve is thoroughly flused. Release the trigger.
- 2. To Flush the sampling valves (18 Fig. 5) place a grounded metal pail under them. Put the pump intake hoses into a 5 gallon (20 liter) container of compatible solvent. Refer to the paint manufactrure's recommendations. Close the mixer manifold and open the sampling ball valves (16 Fig. 5) and sampling valves (18 fig. 5). Flush until all contaminants and fluids are removed. Close the ball valves and sampling valves.
- 3. Trigger the gun to relieve pressure.

#### **Checking the Ratio**

- 1. Open the mixer manifold (9 Fig.5)
- 2. Set the operating pressure. After determining the operating pressure, release the gun trigger and engage the safety latch.
- 3. Close the mixer manifold.
- 4. Open the sample valve (18 Fig. 5) on the secondary pumpside approximately three turns. Open the sampling valve on the primary pump side just one turn. This prevents the pressure frome building up on the secondary pump, which would cause the relief valve (50 of drawing 965-479) to open.
- 5. Place a grounded metal pail under the sampling valves.
- 6. Open the sampling ball valves (16 Fig. 5). Use the sampling valves to adjust the pressures to your normal operating pressure.
- NOTE: The pressure must be within 20% of your normal operating pressure to get a useable sample.



Fig. 5

- 7. Close the sampling ball valves. Put the sampling containers under the sampling valves.
- 8. Open the sampling ball valves. Check the ratio. Make sure the pressure is within 20% of the normal operating pressure. Close the mixer manifold when enough fluid has been dispenced into the sampling containers.

**NOTE:** If the pressure is not within 20% of the normal operating pressure, follow the flushing procedure on page

#### **Troubleshooting Techniques**

Becauxe the pumps are mechanically linked, the action of one pump can affect the readings of the second pump. Therefore, the key to successful troubleshooting is to be sure to isolate the problem.

for example, the secondary pump pressure, as read on the gauge, is low and sluggish during pump changeover. The most likely prblem is a binding primary pump.

To isolate the pump:

- 1. Follow the Pressure Relief Procedure on page 9.
- 2. Disconnect the secondary or primary pump and check the other. Check for rapid gauge response during pump chageover.

#### WARNING

Use very low air pressure to the air motor when making thes checks. This system can produce very hih fluid pressure, which can cause serious injury, including injection, splashing in the eyes or on this kin, and ijury from moving parts. Follow the pressure relief Procedure on page 9.

#### – WARNING –

To Reduce the risk of injuring or amputating a hand, fingers or other body parts, never place your hands or any part of your body or any tools inside the safety panel at any time, for any reason, while the unit is operating.

Problem	Cause	Solution			
System won't run or stops while running	Air pressure or volume too low	Increase, check air compressor			
	Closed or restricted air line or air valve	Open or clean as required			
	Fluid valves closed	Open fluid valve			
	Clogged fluid hose	Replace fluid hose			
	Air motor worn or damaged	Service air motor; see manual for motor			
	Displacement pump stuck	Service desplacement pump. See manuals listed in the chart on the next page			
Solvent not being delever to system	Air pressure or volume too low	Increase; check air compressor			
	Closed or restricted air line or air valve	Open or clean as required			
	Manifold clogged	Clean and service as required			
	No solvent in reservoir	Refill solvent reservoir			
	Air motor worn or damaged	Service air motor; see manual			
Fluids not mixing properly	Clogged filter in fluid line	Cleand; replace element if necesary			
	Manifold problems	Check manifold			
	Off ratio	Check ratio			
	Clogged fluid hose	Replace fluid hose			
System speeds up or runs erratically	Fluid containers are empty Check often - keep filled				
	Displacement pump part worn or damaged	Service displacement pump. See pump manuals			
Squeaking or knocking noise is heard	Bearing(s) dry or worn	Lubricate; replace bearing(s) if necessary			

# **VRHC Proportioner Troubleshooting**

- This chart will determine pump malfunction using the proportioner fluid gauges.
- Faulty manifold check valves can mask pump cylinder problems. Always keep these valves operating properly.
- The gauge relationships should be observed during the stroke direction indecated and immediately after closing the manifold.
- The pressure relationship in between the two components of a 1:1 mix ratio proortioner will be approximately equal. With wider ratios, the pressure relationship changes proportiantely.

i.e. 20:1 MIX RATIO

- A problem in the 20 parts would greatly affect the 1 part cylinder pressure reading
- problem in the 1 part cylinder willnot greatly affect the pressure reading of the 20 parts cylinder.









# Service

- 1. Follow the pressure relief procedure befor doing any service work.
- 2. Keep pump wet cups filled with throat seal liquid
- 3. Follwo service instructions for individual components (pumps, motors, relief valves).

# **Technical Data**

Pump speed	Air input pressure	Sound pressure	Sound power
40 Cycles/ min	90 Psi (6.3 bar)	86.0 dBa	101.0 dBa
	70 Psi (4.9 bar)	84.0 dBa	100.6 dBa
	40 Psi (2.8 bar)	83.5 dBa	100.6 dBa

Wetted Parts .....Carbon Steel;Chrome,Zinc, and Electroless Nickel Plating;304, 440 and 17-4 PHGrades of Stainless Steel Tungsten Carbide; Ductile Iron; Delrin®; Teflon®; Leather

Pump speed	Air input pressure	Sound pressure	Sound power
20 Cycles/ min	90 Psi (6.3 bar)	85.0 dBa	99.9 dBa
	70 Psi (4.9 bar)	83.0 dBa	98.9 dBa
	40 Psi (2.8 bar)	80.5 dBa	98.0 dBa

Tested in accordance with ISO 3744.















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## **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'ssole remedy for breach of this warranty, Graco will, for a period of twelve months or thwo thousand hours of operations from time of sale, repair or replace any part of the quipment proven defecive. This warranty applies only when the equipment isinstalle, operated and maintainded in accordance with Graco's 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 conditonen 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, rpairs will be made at a reqonable 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 production 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 od the purchase price. Any action for breach of warranty must be brought within two (2) years of the date of sale.

#### EQUIPMENT NOT COVER BY GRACO WARRANTY

Graco makes not warranty, and disclaims all implied **warranties of mechantability 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 elctric motor, switches, hose, etc.) are subject to the warranty, if any, of their manufacturer. Graco will provide purhaser with reasonable assistance in making any claim for breach of these warranties.

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 PRINTED IN BELGIUM
 6000XXX E Oktober 1996