

# INSTRUCTIONS-PARTS LIST



**307-434**

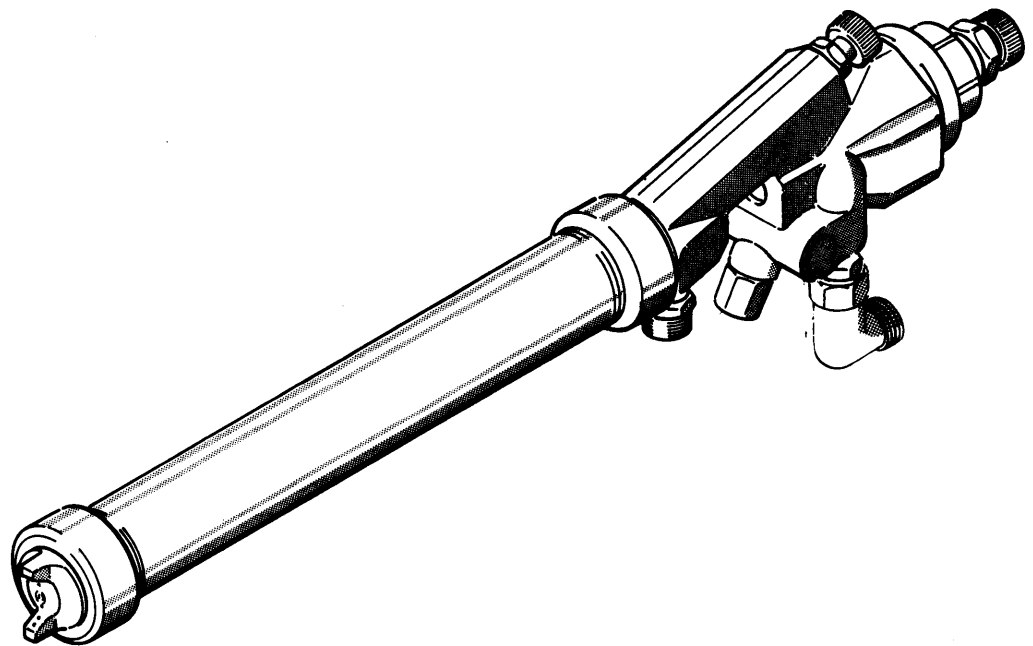
Rev A

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

## **AUTOMATIC 100 KV ELECTROSTATIC AIR SPRAY GUN**

*100 psi (7 bar) MAXIMUM WORKING PRESSURE*

**Model 216-119 With 0.047 in. (1.2 mm) fluid  
tip and standard air cap.**



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

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## WARNING

Before cleaning the gun nozzle or attempting to service the gun or other components, always turn off the high voltage first, then shut down paint pump and trigger gun to relieve fluid pressure.

### Grounding

All components of the system, except the gun and paint hoses, must be electrically grounded. Be sure the electric power circuit is properly grounded.

Be sure your gun is not grounded. Use ungrounded paint hoses to gun only, and be sure your supply pump and the object you are painting are grounded.

All conductive objects within 10 ft (3m) of the gun must be electrically grounded.

The object being coated must be grounded.

Be sure your installation complies with all applicable local codes.

ALWAYS use the lowest pressure possible when flushing and use a grounded metal waste container.

When flushing, avoid conductive solvents, if possible. Be sure to turn off H.V. Power Supply before flushing, and to remove all solvent from gun before turning on high voltage.

### Operating

Never use or store solvents in the spray area.

NEVER IMMERSE THE SPRAY GUN IN SOLVENT OR OTHER LIQUID.

Keep work hangers and conveyor equipment clean so work pieces are well grounded.

## How The Electrostatic Automatic Air Spray Gun Works

A transformer supplies high voltage current through the cable to the gun's ionizing electrode, where the electrostatic field is developed. The pump supplies paint

through the hose and gun, where it is electrostatically charged as it passes the ionizing electrode. The charged paint is attracted to the grounded work piece, wrapping around it and coating surfaces indirectly.

## INSTALLATION

Be sure your installation complies with Federal, State and local codes for the installation of electrical apparatus in a Class 1, Divisions 1 and 2 Hazardous Location.

The particular type and size system for your operation will have to be custom designed for your needs. For a correctly sized system, contact the Graco Finishing System Division, Franklin Park, Illinois.

Mount the gun on an insulated stationary support or reciprocator arm.

The spray gun has a mounting hole to fit a 0.5 in. (13 mm) diameter rod. Use a mounting fixture which allows adjustment of the spray pattern direction and distance from the work.

### WARNING

Mount the gun at least 12" (305 mm) from the work. To prevent arcing, the gun head must be at least 12" (305 mm) from any ground. Follow OSHA 29 CFR 1910.107(h)(6).

Install a normally closed, 3-way air solenoid valve in the cylinder air supply line. BEFORE CONNECTING AIR LINES BLOW THEM OUT TO REMOVE METAL CHIPS AND OTHER FOREIGN PARTICLES. Connect an air

hose from the solenoid valve to the gun's 1/4" npt(m) cylinder air inlet. Connect an air supply line to the 1/4" npt(m) atomizing air inlet.

BEFORE CONNECTING FLUID LINES, BLOW THEM OUT WITH AIR AND FLUSH WITH SOLVENT. BE SURE THAT THE SOLVENT YOU USE IS COMPATIBLE WITH THE MATERIAL TO BE SPRAYED.

Connect a fluid hose to the paint supply pump's outlet and to the gun's 3/8 npsm fluid inlet.

Install fluid tip in gun. Be sure fluid pressure is relieved and high voltage turned off before installing tip.

### Recommended Hose Sizes (General Purpose)

MATERIAL	
0-10 ft (0-3 m)	1/4" ID
10-35 ft (3-11 m)	3/8" ID
35-100 ft (11-30 m)	1/2" ID
100-200 ft (30-61m)	3/4" ID

AIR	
0-50 ft (0-15 m)	1/4" ID
50-100 ft (15-30 m)	5/16" ID
100-200 ft (30-61 m)	3/4" ID

## OPERATION

Adjust the system's control device so the gun starts spraying just before the spray meets the workpiece, and stops as soon as it is past.

The gun requires a minimum of 30 psi (2 bar) air pressure to the cylinder.

### Fluid Control

Adjust the fluid flow to the proper rate, using a fluid

regulator installed in paint line. It is best to adjust flow rate with a fluid regulator.

### Spray Pattern Control


Turn air adjusting screw (36) counterclockwise for a wide flat spray pattern or clockwise to decrease to a round pattern.

**NOTE:** When increasing to a wide, flat pattern, increase supply of fluid to gun to maintain same coverage over larger area.

Direction of spray pattern (horizontal or vertical) is changed by loosening lock ring and turning air cap to the desired position. **TIGHTEN LOCK RING HAND TIGHT. DO NOT OVERTIGHTEN.**

**Normal Spray Pattern**

Proper adjustment will give a spray pattern shaped like this.



**Improper Spray Patterns**



Heavy on top or bottom, right or left. **Caused by** paint buildup on air cap or fluid tip, partially plugged air holes or fluid tip. **To remedy, clean the cap or tip.**

Heavy in the center. Caused by too much, or too thick material. **To remedy, reduce flow by reducing fluid pressure or thinning the paint.**

Split pattern. Caused by insufficient paint, or too much air pressure. **To remedy, increase fluid pressure or reduce air pressure.**

**WARNING**

Make sure the H.V. power supply electricity is turned off before connecting or disconnecting the high voltage leads at guns or junction arm.

Connect high voltage cable to the high voltage adapter (44).

When all adjustments are made, -trigger air, atomizing air, fluid pressure, and fan pattern,-you can turn on the high voltage and begin operation.

**Care of Gun**

Good housekeeping is important. Clean the gun and work area daily. A buildup of conductive residue on either exterior or interior surfaces of gun may interfere with proper operation.

Flush out the gun with an approved solvent at the end of the work day. Wipe the outside of the gun with an approved gun cleaner. Remove the air cap and clean it. If ionizing wire of needle (41) is bent after cleaning, straighten wire so that it is centered in fluid stream. For an approved solvent or gun cleaner, see your local supplier or Graco Branch. Also, refer to OSHA 29 CFR 1910.107(g)(5).

**Cleaning**

After each spraying operation, turn off the high voltage power supply, and solvent flush until all remaining paint is removed from hose and gun.

If air cap needs cleaning, remove and soak in clean compatible solvent (not over 15 minutes) and scrub with a fine bristled brush. To clean out holes in air cap, use a toothpick or other soft implement.

**CAUTION**

Never use metal instruments to clean holes in air cap or fluid tip. Never immerse entire gun in solvent.

**SERVICE**

**TROUBLESHOOTING CHART**

**WHAT'S WRONG**

- Fluid needle packing nut leakage
- Air leakage from front of gun
- Fluid leakage from front of gun
- Spitting or fluttering spray
- Defective spray pattern
- "Orange Peel" finish
- Streaks in finish
- Runs or sags in finish
- Excessive spray fog
- Fluid won't come from spray gun

**WHY**

- Loose needle packing nut or worn packing
- Air valve not seating properly
- Fluid needle not seating properly
- Fluid low
- Loose fluid tip or damaged seat
- Loose air cap, dirty or damaged
- fluid nozzle or air cap
- Needle worn or damaged
- Too much air pressure
- Insufficient air pressure
- Poorly mixed and/or strained fluid
- Fluid thinned out too much
- Improper thinner

**WHAT TO DO**

- Tighten or replace
- Clean, lubricate, service
- Loosen packing nut, clean or replace
- Check fluid supply
- Tighten, clean, replace
- Tighten, clean, clear
- replace
- Replace
- Use least necessary
- Increase air pressure
- Properly mix and strain
- Properly thin fluid
- Use proper thinner

**WARNING**

During cleaning or repair, the H.V. Power Supply must be turned off. Before removing air cap or spray tip, shut down paint pump and trigger gun to relieve fluid pressure.

**CAUTION**

When assembling metal and plastic, extreme care should be taken when starting threads. Applied common sense and good housekeeping will provide you with years of durability and efficiency which is built into this equipment.

These working parts require periodic replacement:

1. Air cap (7).
2. Fluid tip (6).
3. Needle, fluid (41).

**Removing Fluid Tip**

To remove fluid tip (6) for cleaning or replacement, remove the ring nut (8) and air cap (7), turn off the atomizing air, trigger the gun to release needle pressure on the tip. Remove the tip with a wrench. Replace with the needle triggered to the rear.

When replacing air cap (7) on the gun, be sure the wire electrode coming from the needle (41) is centered in the air cap center hole. The best method is to slide the air cap onto fluid housing (5), making sure that the wire goes through center hole of air cap, then tighten ring nut (8), onto barrel (42) allowing air cap to be drawn up evenly on the fluid tip. Check alignment of ionizing wire in the fluid stream.

**Removing Fluid Tip Housing**

If the housing (5) is removed, the o-rings (2) should be replaced and the housing firmly seated. The housing must be torqued no more than 15-20 ft-lb (20 N·m), or plastic threads may become stripped. Lubricate with petroleum jelly new o-rings on housing before replacing in gun barrel.

**NOTE:** Fluid tip (6) must be removed from housing before replacing to avoid damage to ionizing wire.

**Replacing Fluid Needle**

Turn off the atomizing air and fluid, trigger the gun to release needle pressure on the tip. Remove ring nut (8) and air cap (7). Remove fluid tip (6) with a 7/16 in. wrench. Remove nut (19) and screw (31) from the rear of the gun. With a long nose pliers pull out needle extension (46), nut (29), nut (30), spring (33), and needle (41). Unscrew needle (41) from extension (46). (Pliers maybe necessary as Loctite is used on threads.) Install new needle (41), applying Loctite no. 290 or equivalent to threads to prevent needle from coming loose during operation. Reassemble needle into back of gun using extreme care. Ionizing wire must remain straight as it passes through rear actuator packings (18).

After needle is assembled in the gun, replace fluid tip (6) and rear spring (33) and spring (34), along with adjusting screw (31), locknut (19) and air cap (7). For adjustment see Replacing Fluid Needle Extension.

**Replacing Needle Guide**

Needle guide (47) is pressed into rear of fluid housing (5). Remove fluid housing and press out needle guide. When replacing be sure internal chamfered end faces rear of fluid housing.

**Replacing Fluid Needle Extension**

Remove needle (see Replacing Fluid Needle). When replacing extension (46); locknut (29) and needle adjusting nut (30) must be readjusted on needle extension. Push needle (41), needle extension (46) and piston (38) fully forward, and turn the adjusting nut (30) all the way into the piston. Remove needle assembly from piston, turn adjusting nut two turns counterclockwise, and tighten locknut (29). This adjustment provides atomizing air just before the fluid needle is engaged and after seating.

**Replacing Fluid Packing**

The fluid packing (23) is replaced when the needle (41) is removed. Remove the packing nut (22) then pick out the packing and replace. Replace the packing nut. Insert the fluid needle, tighten the packing nut and apply pressure on the packing to a firm seating. Do not over-tighten. The fluid needle should move without binding. When the gun is completely assembled and fluid pressure applied, the packing nut may be tightened to correct a slight leak.

**Removing Gun Barrel**

It is seldom necessary to remove the gun barrel (42) from the gun body (37). When necessary, this is accomplished by unscrewing the gun coupling (8) and carefully lifting away from the gun body. Inspect o-rings (1 and 4) and replace if necessary. To line up guide pin in barrel with hole actuator assembly keep indicator dent into of barrel lined up with top of actuator.

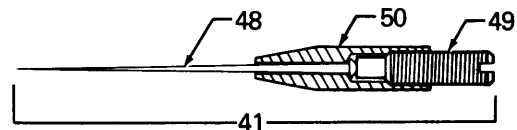
**Replacing Cylinder Adapter**

The cylinder adapter (43) should not be removed unless damaged.

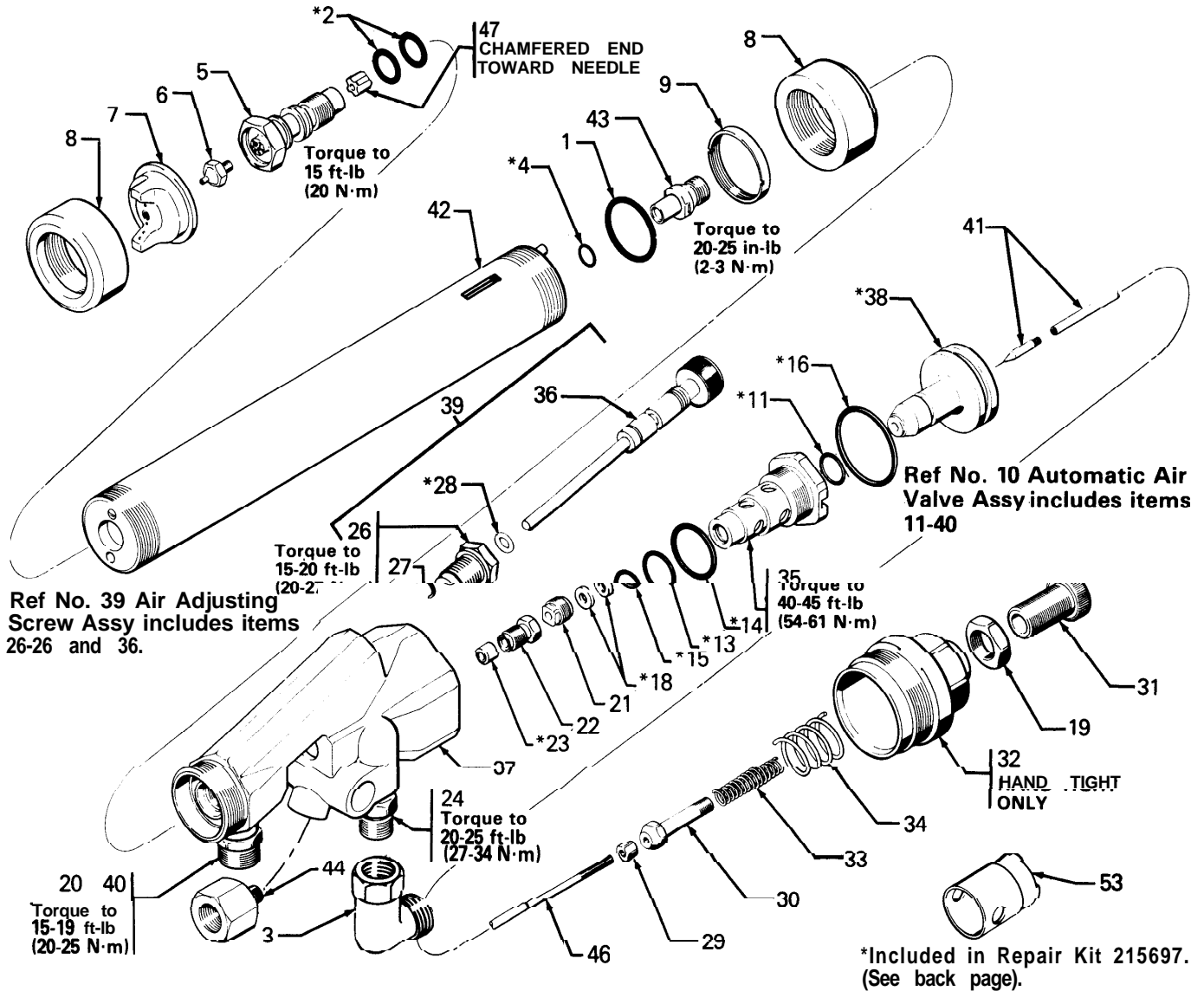
**Replacing Electrode Stem of Fluid Needle**

If electrode stem (48) of fluid needle (41) needs replacement, first unscrew electrode stem from fluid needle extension (46). Unscrew setscrew, and remove old electrode stem.

Insert new electrode stem and replace setscrew. Reassemble fluid needle (41) to fluid needle extension (46).



**ELECTROSTATIC AUTOMATIC  
AIR SPRAY GUN**  
Model 216-119



REF NO.	PART NO.	DESCRIPTION	QTY	REF NO.	PART NO.	DESCRIPTION	QTY
1	103649	PACKING, o-ring; viton	1	31	170-244	SCREW, needle adjusting	1
2	*103-823	PACKING, o-ring; nitrile rubber	2	32	170-249	CYLINDER, air piston	1
3	722-615	ELBOW, 1/4 npt(m) x 1/4 npsm(f) swivel	2	33	724-391	SPRING, compression	1
4	*155-685	PACKING, o-ring; nitrile rubber	1	34	170-253	SPRING, compression	1
5	172-191	HOUSING, fluid tip	1	35	171-722	HOUSING, valve	1
6	177-062	FLUID TIP, See chart for optional tips	1	36	217-198	SCREW, air adjusting	1
7	177-033	AIR CAP, See chart for optional air caps	1	37	21 0-743	HOUSING, valve	1
8	176-387	RETAINING RING	2	38	*208-718	PISTON, air	1
9	176-388	RETAINING RING	1	39	217-199	AIR ADJUSTING SCREW ASSY. includes items 26-28, 36 (part of ref no. 10)	1
10	217-013	AUTOMATIC AIR VALVE ASSY. Series "B" includes items 11-40 and 52	1	40	171-052	GASKET, PTFE (part of ref no. 10)	1
11	103338	PACKING, o-ring; viton	1	41	"215-695	NEEDLE, fluid	1
13	103-523	GASKET; copper	1	42	214-919	BARREL	1
14	*103-524	GASKET; copper	1	43	724306	ADAPTER, cylinder	1
15	*103-610	PACKING, o-ring; viton	1	44	728-136	ADAPTER, 3/8-16 x 5/8 NPT	1
16	"103649	PACKING, o-ring; viton	1	46	176-390	NEEDLE, ext-fluid	1
18	"160-240	PACKING, v-block; leather	2	47	176-513	GUIDE, needle	1
19	162-782	LOCKNUT	1	48	215696	STEM, electrode (replacement kit of 25)	1
20	*174-099	STUD, coupler	1	49	177-122	STEM, coupling	1
21	171-333	NUT, packing	1	50	177-121	STEM, fluid	1
22	171332	NUT, packing	1	53	177-142	WRENCH	1
23	*106-901	PACKING, needle; PTFE	1				
24	169-870	ADAPTER, air inlet; 1/4" npsm	2				
26	176-773	HOUSING, spring	1				
27	105-456	WASHER	1				
28	*168-110	O-RING, polyurethane	1				
29	170-242	NUT, lock; needle	1				
30	170-243	NUT, needle adjusting	1				

\*Recommended "tool box" spare parts. Keep on hand to reduce down time.

Order parts by name and number. Always give the model number and series letter of the assembly for which you are ordering.

# AIR CAP CONSUMPTION AND FLUID TIP FLOW RATE CHART

Air Cap Part Number	Approximate Pattern Length 254 mm (10 in) from gun	Air Consumption m <sup>3</sup> /min @ 2.06 bar (CFM @ 30 PSI)	Description	* 177-060 177-062 177-061 177-063				Fluid Tip Part No
				177-532 6-18 1 mm (0.040 in)	55-710 12-24 1.2 mm (0.047 in)	91-1182 20-40 1.5 mm (0.060 in)	1035-1479 3 5 5 0 1.8 mm (0.070 in)	
177-033*	381-432 mm (15-17 in)	0.266 (9.5)	Round end pattern, excellent atomization for automatic and hand gun high production. Medium viscosity materials 19-30 sec. No. 2 Zahn cup - metallics, lacquers and enamels.	x	x	x		Flow Rate ml/min oz/min Fluid Tip Size
177-034	330-381 mm (13-15 in)	0.236 (8.5)	Round end pattern, very good atomization for medium automatic hand gun production. Medium viscosity materials 19-30 sec. No. 2 Zahn cup - primers, lacquers, enamels, sealers	<b>X</b>	x	x		
177-036	381-432 mm (15-17 in)	0.28 (10)	Tapered end pattern, excellent atomization for heavy and high solid material. High viscosity materials over 28 sec No. 4 Zahn cup - high solid lacquers, enamels, epoxies and urethanes.		x	x	x	
177-037	279-330 mm (11-13 in)	0.196 (7)	Round end pattern, good atomization for low production. Low viscosity materials 15-22 sec No. 2 Zahn cup - stains, primers, sealers and lacquers.	<b>X</b>	<b>X</b>			
177-039	356-406 mm (14-16 in)	0.296 (10.2)	Tapered end pattern, very good atomization for heavy viscosity material over 28 sec No. 4 Zahn cup - Water-Base and Frit materials, acrylics, alkyds, vinyl, enamels and lacquers.			x	x	

\*Standard on Model 216-119.

## EQUIVALENCE CHART

The Equivalence Chart is designed to update old style guns with Fluid Tip and Air Cap part numbers no longer available, to current Fluid Tip and Air Cap part numbers.

The left side of the chart identifies old style guns with the Fluid Tip and Air Cap part numbers which are no longer available.

The right side of the chart gives the equivalent, current Fluid Tip and Air Cap part number that should be ordered when replacing parts.

OLD GUN				NEW GUN			
Part Number	Fluid Nozzle	Orifice Size	Air Cap	Part Number	Fluid Nozzle	Orifice Size	Air Cap
214-918	172-834	0.028	172-841	216-119	177-060	0.040	177-033
215-376	172-835	0.040			177-062	0.047	177-034 177-037
215-377							177-033
	172-836	0.060	172-842 172-318 171-630		177-061	0.060	177-036
							177-033
							177-034
					177-063	0.070	177-036 177-039

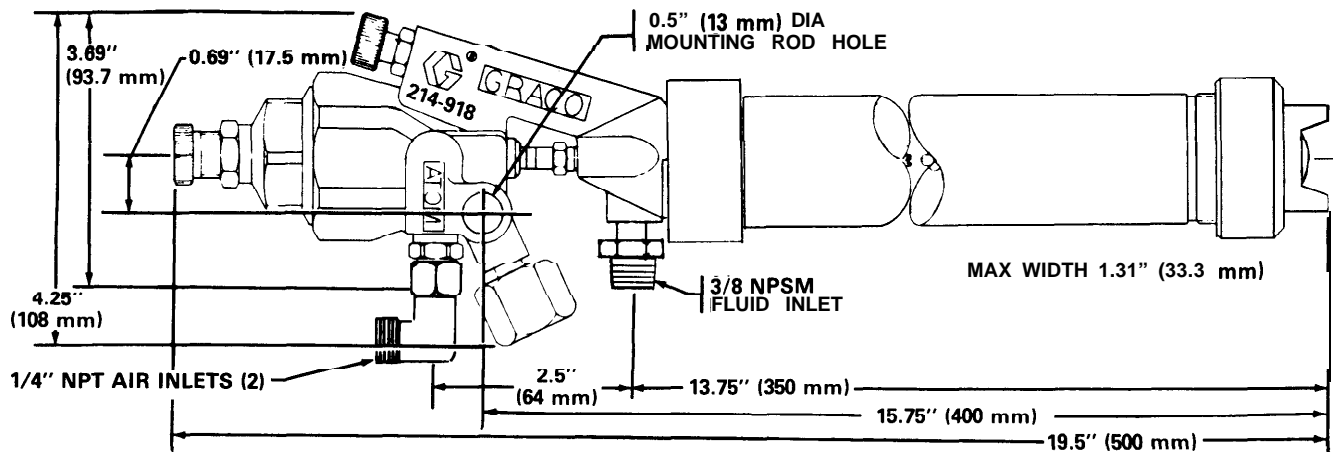
# SOLVENT CHART

HIGH RESISTANCE			LOW RESISTANCE					EVAP RATE MIN.	FLASH POINT F.
ALIPHATIC HYDROCARBONS	AROMATIC HYDROCARBONS	CHLORINATED SOLVENTS	NITRO PARAFFINS	ESTERS	GLYCOL ETHERS	ALCOHOLS	KETONES		
		NETHYLENE CHLORIDE						0.4	NONE
HEXANE								0.7	< 0°
				METHYL ACETATE				0.75	30
							ACETONE .05 MEG.	0.6	15
TEXTILE SPIRITS								1.06	< 0°
	BENZENE							1.2	< 5
		TRICHLOR-ETHYLENE						1.3	NONE
				ETHYL ACETATE 0.46 MEG.				1.4	29°
							MEK .05 MEG.	1.5	35
						METHYL ALCOHOL 0-RES.		1.6	40°
	SC-1 SOLVESSO-50							2.5	a
	TOLUOL							2.7	41
			1-NITRO PROPANE					2.9	
						ETHYL ALCOHOL .02 MEG.		3.0	40
						SOPROPVL ALCOHOL 0.14 MEG.		3.6	55
							M.T.B.K. 0.25 TO 0.40 MEG.	3.7	75
VM & P NAPHTHA								3.95	54°
		MONOCHLOR BENZENE						5.4	105
			2-NITRO PROPANE .02 MEG.					5.6	
				N-BUTYL ACETATE 14 TO 30 MEG.				5.8	105
			NITRO METHANE					8.9	
				AMYL ACETATE 10 MEG.				9.7	105
	XYLOL							10.8	81°
							N-BUTYL ALCOHOL 0.6 TO .3 MEG.	11.6	99
						METHYL CELLO. SOLVE .02 MEG.		11.6	120
				METHYL AMYL ACETATE				12.3	110
	TURPENTINE							14	91°
							AMYL ALCOHOL .08 MEG.	19	116
	SC-106 SOLVESSO-100							21	107°
						ETHYL CELLO. SOLVE .06 MEG.		29	115
							DIACETONE 14 MEG.	29	155
	DEPTINE							33	120°
MINERAL SPIRITS								35.1	104°
						BUTYL CELLOSOLVE 0.8 TO .19 MEG.		58	166
ODORLESS MIN. ERAL SPIRITS								66.2	130°
							CVCLD HEXANOL 2.6 MEG.	72.5	154
	SC-150 SOLVESSO-150							96	152°
						DOWANOL DPM .03 MEG.		116	165
							ISOPHORNE .07 MEG.	193	205
	HNE OIL							485	178°
							OCTYL ALCOHOL	< 580	185
						METHYL CARBITOL .06 MEG.		< 580	200
						ETHYL CARBITOL 0.1 MEG.		669	
	SC-450							750	206°
	SHELL-403							1800	
						BUTYL CARBITOL 0.3 MEG.		1040	230
						DOWANOL TPM 1.2 MEG.		< 2000	250

RESISTANCE MEASURED WITH GRACO PROBE AND METER. LOW RESISTANCE, OR POLAR. SOLVENTS MEASURE NORMALLY LESS THAN 1 MEG HIGH RESISTANCE. OR NONPOLAR SOLVENTS MEASURE INFINITY.

SHADED AREAS SHOW HIGH RESISTANCE ■ N-BUTYL ACETATE. AMYLACETATE. \* TAG CLOSED CUP

## DIMENSIONAL DRAWING



## ACCESSORIES

(Must be purchased separately)

### STRAINER (AIR OR PAINT) 202-271

Uses the following filter screen:

157-332 (40 mesh)  
156-967 (60 mesh)  
156-939 (100 mesh)



### H-V CABLES

724-410

For stationary mounting, 2 ft (610 mm) lg

727-997

For reciprocator mounting, 15 in. (381 mm) lg

### REPAIR KIT 215-697 (must be purchased separately).

Consists of:

Ref No.	Qty.
2	2
4	1
11	1
13	1
14	1
15	1
16	2
18	2
23	1
28	1
38	1

### ELECTRODE KIT 215-696

Consists of (25) 177-123 Electrode

### KIT, REPAIR, GUN (FAN VALVE) 215-506

Ref No.	Qty.
27	1
28	1
26	1
36	1

## TECHNICAL DATA

Maximum operating voltage:	100,000 volts
Maximum air & fluid working pressure:	100 psi (7 bar)
Minimum air cylinder operating pressure:	30 psi (2 bar)
Fluid inlet:	3/8 npsm(m)
Atomizing air inlet:	1/4 npt(m)
Cylinder air inlet:	1/4 npt(m)
Weight:	3 lb. 2 oz. (1.4 kg)

## THE GRACO WARRANTY

Graco Inc. warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship under normal use and service. This warranty extends to the original purchaser for a period of 12 months from the date of purchase and applies only when the equipment is installed and operated in accordance with written factory recommendations. This warranty does not cover damage or wear which, in the reasonable judgment of Graco, arises from misuse, abrasion, corrosion, negligence, accident, substitution of non-Graco parts, faulty installation or tampering.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective for examination by Graco to verify the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge, any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in workmanship or material, repairs will be made at a reasonable charge and return transportation will be charged.

THIS LIMITED WARRANTY IS EXCLUSIVE, AND IS 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.

EQUIPMENT NOT COVERED BY GRACO WARRANTY. Accessories or components of equipment sold by Graco that are not manufactured by Graco (such as electric motors, switches, hose, etc.) are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making such claims.

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