

Ransburg RPA-2 Powder Applicator



Model: A12950

IMPORTANT: Before using this equipment, carefully read SAFETY PRECAUTIONS and all instructions in this manual. Keep this Service Manual for future reference.

NOTE: This manual has been changed from revision **LN-9271-12.4** to revision **LN-9271-12-R5**. Reasons for this change are noted under “Manual Change Summary” inside the back cover of this manual.

CONTENTS

SAFETY:	4-8
Safety Precautions	4
Hazards / Safegaurds	5
INTRODUCTION:	9-13
General Description	9
RPA-2 Powder Applicator - Parts List	10
Tools Required for Assembly/Dis-Assembly	11
Specifications	13
INSTALLATION:	14-16
Connection Procedure	14
Low Voltage Cable Installation and Removal	15
OPERATION:	17
General Operation	17
Start-Up	17
MAINTENANCE:	18-27
Troubleshooting Guide	18
Inspecting and Cleaning the Applicator	19
Disassembling the Applicator	20
Assembly of the Applicator	24
When to Replace Parts	25
HV Overload Validation	26
PARTS IDENTIFICATION:	28-39
RPA-2 Assembly	28
RPA-2 Open Bore Nozzle	30
RPA-2 with Replacement Elbow, Upper Tube and Electrode Holder	30
RPA-2 Parts List	31
RPA-2 Powder Applicator Model Identification	32
RPA-2 Powder Applicator Shaping Air Cowl (A11151-00) - Parts List	35
Shroud Air (Open Bore Nozzle) (A12056-00) - Parts List	36
Electrode Holder Model Identification	37
Recommended Spare Parts	38
MANUAL CHANGE SUMMARY:	40
Manual Changes	40

SAFETY

SAFETY PRECAUTIONS

Before operating, maintaining or servicing any Ransburg electrostatic coating system, read and understand all of the technical and safety literature for your Ransburg products. This manual contains information that is important for you to know and understand. This information relates to **USER SAFETY** and **PREVENTING EQUIPMENT PROBLEMS**. To help you recognize this information, we use the following symbols. Please pay particular attention to these sections.

WARNING

A **WARNING!** states information to alert you to a situation that might cause serious injury if instructions are not followed.

CAUTION

A **CAUTION!** states information that tells how to prevent damage to equipment or how to avoid a situation that might cause minor injury.

NOTE

A **NOTE** is information relevant to the procedure in progress.

While this manual lists standard specifications and service procedures, some minor deviations may be found between this literature and your equipment. Differences in local codes and plant requirements, material delivery requirements, etc., make such variations inevitable. Compare this manual with your system installation drawings and appropriate Ransburg equipment manuals to reconcile such differences.


Careful study and continued use of this manual will provide a better understanding of the equipment and process, resulting in more efficient operation, longer trouble-free service and faster, easier troubleshooting. If you do not have the manuals and safety literature for your Ransburg system, contact your local Ransburg representative or Ransburg.



WARNING


- The user **MUST** read and be familiar with the Safety Section in this manual and the Ransburg safety literature therein identified.
- This equipment is intended to be used by trained personnel **ONLY**.
- This manual **MUST** be read and thoroughly understood by **ALL** personnel who operate, clean or maintain this equipment! Special care should be taken to ensure that the **WARNINGS** and safety requirements for operating and servicing the equipment are followed. The user should be aware of and adhere to **ALL** local building and fire codes and ordinances as well as **NFPA-33 AND EN 50176 SAFETY STANDARDS, LATEST EDITION**, or applicable country safety standards, prior to installing, operating, and/or servicing this equipment.




WARNING

- The hazards shown on the following pages may occur during the normal use of this equipment.

<p>AREA Tells where hazards may occur.</p>	<p>HAZARD Tells what the hazard is.</p>	<p>SAFEGUARDS Tells how to avoid the hazard.</p>
<p>Spray Area</p> 	<p>Fire Hazard</p> <p>Improper or inadequate operation and maintenance procedures will cause a fire hazard.</p> <p>Protection against inadvertent arcing that is capable of causing fire or explosion is lost if any safety interlocks are disabled during operation. Frequent Power Supply or Controller shutdown indicates a problem in the system requiring correction.</p>	<p>Fire extinguishing equipment must be present in the spray area and tested periodically.</p> <p>Spray areas must be kept clean to prevent the accumulation of combustible residues.</p> <p>Smoking must never be allowed in the spray area.</p> <p>The high voltage supplied to the atomizer must be turned off prior to cleaning, flushing or maintenance.</p> <p>Spray booth ventilation must be kept at the rates required by NFPA-33, OSHA, country, and local codes. In addition, ventilation must be maintained during cleaning operations using flammable or combustible solvents.</p> <p>Electrostatic arcing must be prevented. Safe sparking distance must be maintained between the parts being coated and the applicator. A distance of 1 inch for every 10KV of output voltage is required at all times.</p> <p>Test only in areas free of combustible material. Testing may require high voltage to be on, but only as instructed.</p> <p>Non-factory replacement parts or unauthorized equipment modifications may cause fire or injury. If used, the key switch bypass is intended for use only during setup operations. Production should never be done with safety interlocks disabled.</p> <p>The paint process and equipment should be set up and operated in accordance with NFPA-33, NEC, OSHA, local, country, and European Health and Safety Norms.</p>

<p>AREA Tells where hazards may occur.</p>	<p>HAZARD Tells what the hazard is.</p>	<p>SAFEGUARDS Tells how to avoid the hazard.</p>
<p>Spray Area</p> 	<p>Explosion Hazard</p> <p>Improper or inadequate operation and maintenance procedures will cause a fire hazard.</p> <p>Protection against inadvertent arcing that is capable of causing fire or explosion is lost if any safety interlocks are disabled during operation.</p> <p>Frequent Power Supply or Controller shutdown indicates a problem in the system requiring correction.</p>	<p>Electrostatic arcing must be prevented. Safe sparking distance must be maintained between the parts being coated and the applicator. A distance of 1 inch for every 10KV of output voltage is required at all times.</p> <p>Unless specifically approved for use in hazardous locations, all electrical equipment must be located outside Class I or II, Division 1 or 2 hazardous areas, in accordance with NFPA-33.</p> <p>Test only in areas free of flammable or combustible materials.</p> <p>The current overload sensitivity (if equipped) MUST be set as described in the corresponding section of the equipment manual. Protection against inadvertent arcing that is capable of causing fire or explosion is lost if the current overload sensitivity is not properly set. Frequent power supply shutdown indicates a problem in the system which requires correction.</p> <p>Always turn the control panel power off prior to flushing, cleaning, or working on spray system equipment.</p> <p>Before turning high voltage on, make sure no objects are within the safe sparking distance.</p> <p>Ensure that the control panel is interlocked with the ventilation system and conveyor in accordance with NFPA-33, EN 50176.</p> <p>Have fire extinguishing equipment readily available and tested periodically.</p>
<p>General Use and Maintenance</p> 	<p>Improper operation or maintenance may create a hazard.</p> <p>Personnel must be properly trained in the use of this equipment.</p>	<p>Personnel must be given training in accordance with the requirements of NFPA-33, EN 60079-0.</p> <p>Instructions and safety precautions must be read and understood prior to using this equipment.</p> <p>Comply with appropriate local, state, and national codes governing ventilation, fire protection, operation maintenance, and housekeeping. Reference OSHA, NFPA-33, EN Norms and your insurance company requirements.</p>

AREA Tells where hazards may occur.	HAZARD Tells what the hazard is.	SAFEGUARDS Tells how to avoid the hazard.
<p>Spray Area / High Voltage Equipment</p> 	<p>Electrical Discharge</p> <p>There is a high voltage device that can induce an electrical charge on ungrounded objects which is capable of igniting coating materials.</p> <p>Inadequate grounding will cause a spark hazard. A spark can ignite many coating materials and cause a fire or explosion.</p>	<p>Parts being sprayed and operators in the spray area must be properly grounded.</p> <p>Parts being sprayed must be supported on conveyors or hangers that are properly grounded. The resistance between the part and earth ground must not exceed 1 meg ohm. (Refer to NFPA-33.)</p> <p>Operators must be grounded. Rubber soled insulating shoes should not be worn. Grounding straps on wrists or legs may be used to assure adequate ground contact.</p> <p>Operators must not be wearing or carrying any ungrounded metal objects.</p> <p>When using an electrostatic handgun, operators must assure contact with the handle of the applicator via conductive gloves or gloves with the palm section cut out.</p> <p>NOTE: REFER TO NFPA-33 OR SPECIFIC COUNTRY SAFETY CODES REGARDING PROPER OPERATOR GROUNDING.</p> <p>All electrically conductive objects in the spray area, with the exception of those objects required by the process to be at high voltage, must be grounded. Grounded conductive flooring must be provided in the spray area.</p> <p>Always turn off the power supply prior to flushing, cleaning, or working on spray system equipment.</p> <p>Unless specifically approved for use in hazardous locations, all electrical equipment must be located outside Class I or II, Division 1 or 2 hazardous areas, in accordance with NFPA-33.</p> <p>Avoid installing an applicator into a fluid system where the solvent supply is ungrounded.</p> <p>Do not touch the applicator electrode while it is energized.</p>

<p>AREA Tells where hazards may occur.</p>	<p>HAZARD Tells what the hazard is.</p>	<p>SAFEGUARDS Tells how to avoid the hazard.</p>
<p>Electrical Equipment</p> 	<p>Electrical Discharge</p> <p>High voltage equipment is utilized in the process. Arcing in the vicinity of flammable or combustible materials may occur. Personnel are exposed to high voltage during operation and maintenance.</p> <p>Protection against inadvertent arcing that may cause a fire or explosion is lost if safety circuits are disabled during operation.</p> <p>Frequent power supply shut-down indicates a problem in the system which requires correction.</p> <p>An electrical arc can ignite coating materials and cause a fire or explosion.</p>	<p>Unless specifically approved for use in hazardous locations, the power supply, control cabinet, and all other electrical equipment must be located outside Class I or II, Division 1 and 2 hazardous areas in accordance with NFPA-33 and EN 50176.</p> <p>Turn the power supply OFF before working on the equipment.</p> <p>Test only in areas free of flammable or combustible material.</p> <p>Testing may require high voltage to be on, but only as instructed.</p> <p>Production should never be done with the safety circuits disabled.</p> <p>Before turning the high voltage on, make sure no objects are within the sparking distance.</p>
<p>Toxic Substances</p> 	<p>Chemical Hazard</p> <p>Certain materials may be harmful if inhaled, or if there is contact with the skin.</p>	<p>Follow the requirements of the Safety Data Sheet supplied by coating material manufacturer.</p> <p>Adequate exhaust must be provided to keep the air free of accumulations of toxic materials.</p> <p>Use a mask or respirator whenever there is a chance of inhaling sprayed materials. The mask must be compatible with the material being sprayed and its concentration. Equipment must be as prescribed by an industrial hygienist or safety expert, and be NIOSH approved.</p>
<p>Spray Area</p> 	<p>Explosion Hazard — Incompatible Materials</p> <p>Halogenated hydrocarbon solvents for example: methylene chloride and 1,1,1, - Trichloroethane are not chemically compatible with the aluminum that might be used in many system components. The chemical reaction caused by these solvents reacting with aluminum can become violent and lead to an equipment explosion.</p>	<p>Spray applicators require that aluminum inlet fittings be replaced with stainless steel.</p> <p>Aluminum is widely used in other spray application equipment - such as material pumps, regulators, triggering valves, etc. Halogenated hydrocarbon solvents must never be used with aluminum equipment during spraying, flushing, or cleaning. Read the label or data sheet for the material you intend to spray. If in doubt as to whether or not a coating or cleaning material is compatible, contact your coating supplier. Any other type of solvent may be used with aluminum equipment.</p>

INTRODUCTION

GENERAL DESCRIPTION

This operating manual contains all important information required for working with the **RPA-2 Powder Applicator**. It will give you references and tips for the optimal use of your new powder coating system.

The RPA-2 is intended exclusively for the electrostatic coating with organic powders. Any other use is considered as non-conforming. The manufacturer is not responsible for any damage resulting from this; the risk for this is assumed by the user alone.

With an integrated high voltage generator (cascade), the RPA-2 is particularly suitable for the coating of car bodies and parts. The applicator is designed for operation on a freely programmable hollow wrist robot (up to 7 axes).

The RPA-2 is installed on the front side of a follow-arm coating robot. An appropriate adapter piece for the corresponding robot type is used for fitting the applicator to the robot. This adapter provides a locating pin for exact positioning of the applicator, as well as the fixture of the applicator cable and hoses.

The RPA-2 has a high and constant transfer efficiency.

The applicator is quick detachable, therefore fast and easy for maintenance and repair.

The wear parts can be easily changed, even with the applicator attached to the robot.

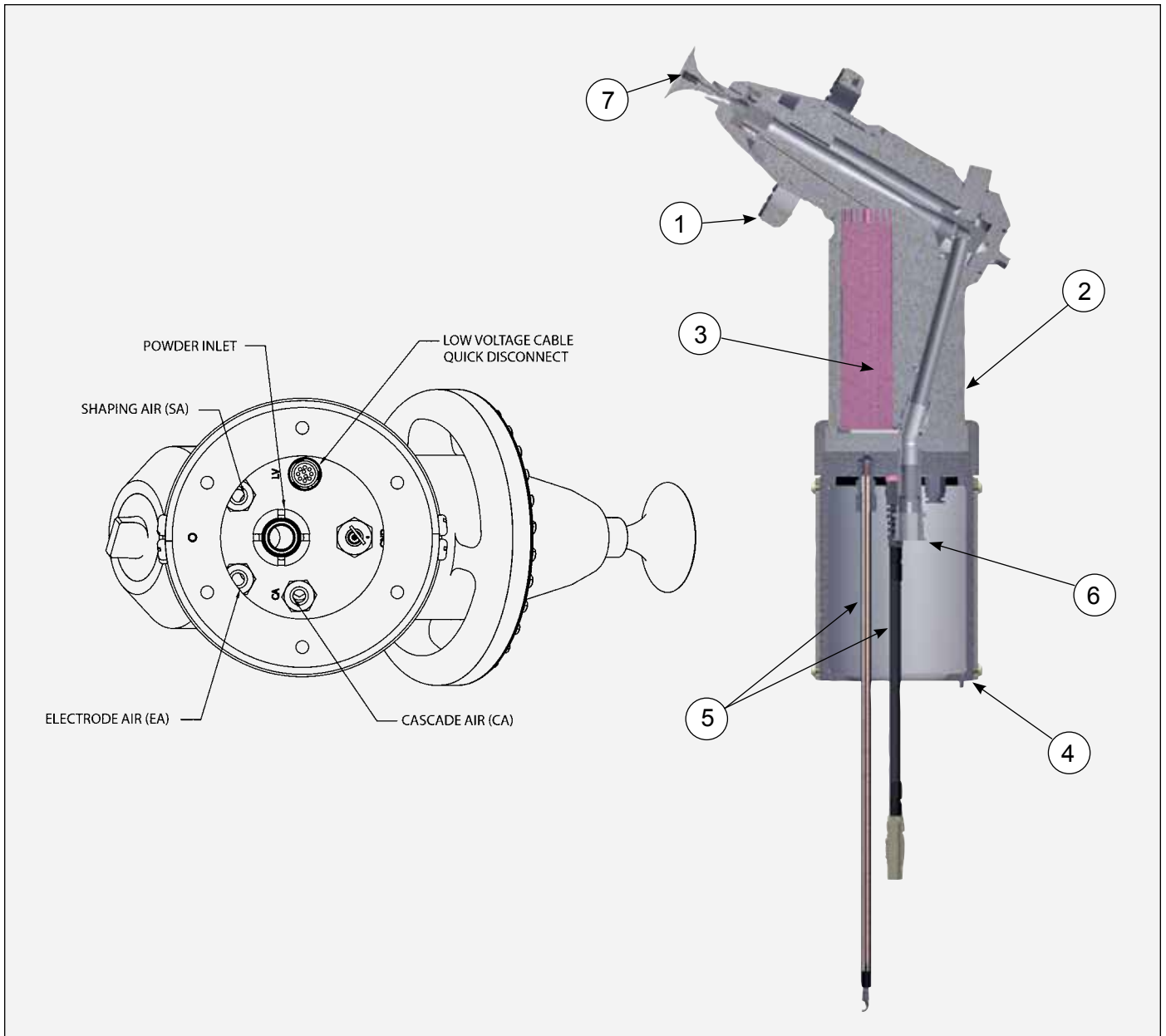


Figure 1: RPA-2 Powder Applicator

RPA-2 POWDER APPLICATOR - PARTS LIST	
Item #	Description
1	Shaping Air
2	Applicator Body
3	High Voltage Cascade (Internal)
4	Robot Adapter
5	Applicator Ground Cable and Low Voltage Cable
6	Powder Hose Connection
7	Nozzle

TOOLS REQUIRED FOR ASSEMBLY/DIS-ASSEMBLY



**A13001-00
Tool - Powder
Inlet Fitting
(Included with
applicator)**

**Adjustable
Wrench**

**76772-01
Spanner Wrench**

**Flat Blade
Screwdriver**

Hex Keys
6mm 3/16 3/32

High Voltage Generation

The applicator high voltage control unit supplies a high frequency low-voltage signal to the cascade. This voltage is fed through the applicator cable and the cascade connection.

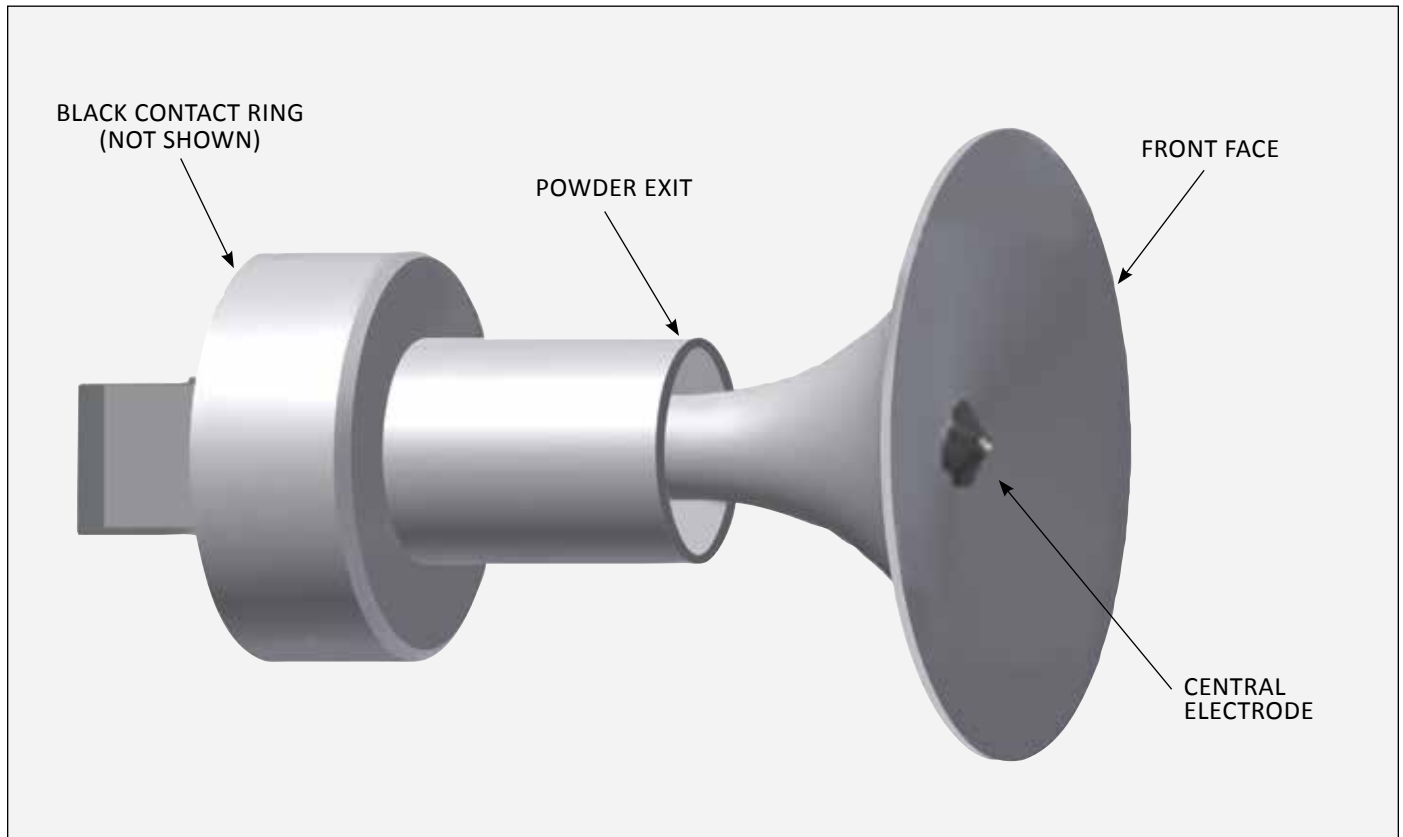
The low-voltage signal is multiplied in the cascade to produce the necessary high voltage (Up to 100 kV).

The high voltage is fed through a conductive path in the atomizer to the central electrode (See figure 1)

The powder is charged by means of the central electrode. The high voltage, which is produced by the cascade in the applicator, is connected to the electrode through the black contact ring on the nozzle holder. The round nozzle front face is rinsed with compressed air in order to prevent powder accumulations. The electrode rinsing air is fed into the electrode holder through the small hole in the black contact ring of the nozzle holder. The electrode rinsing air volume is typically maintained at a constant setting of 40-50 SLPM.

Round Jet Nozzle With Air Cleaned Electrode

The round nozzle shapes and distributes the powder. The powder cloud obtains a bell-similar spray pattern by the deflector plate and by the dynamic powder/air flow.



Round Nozzle (Figure 1)

SPECIFICATIONS

Electrical:

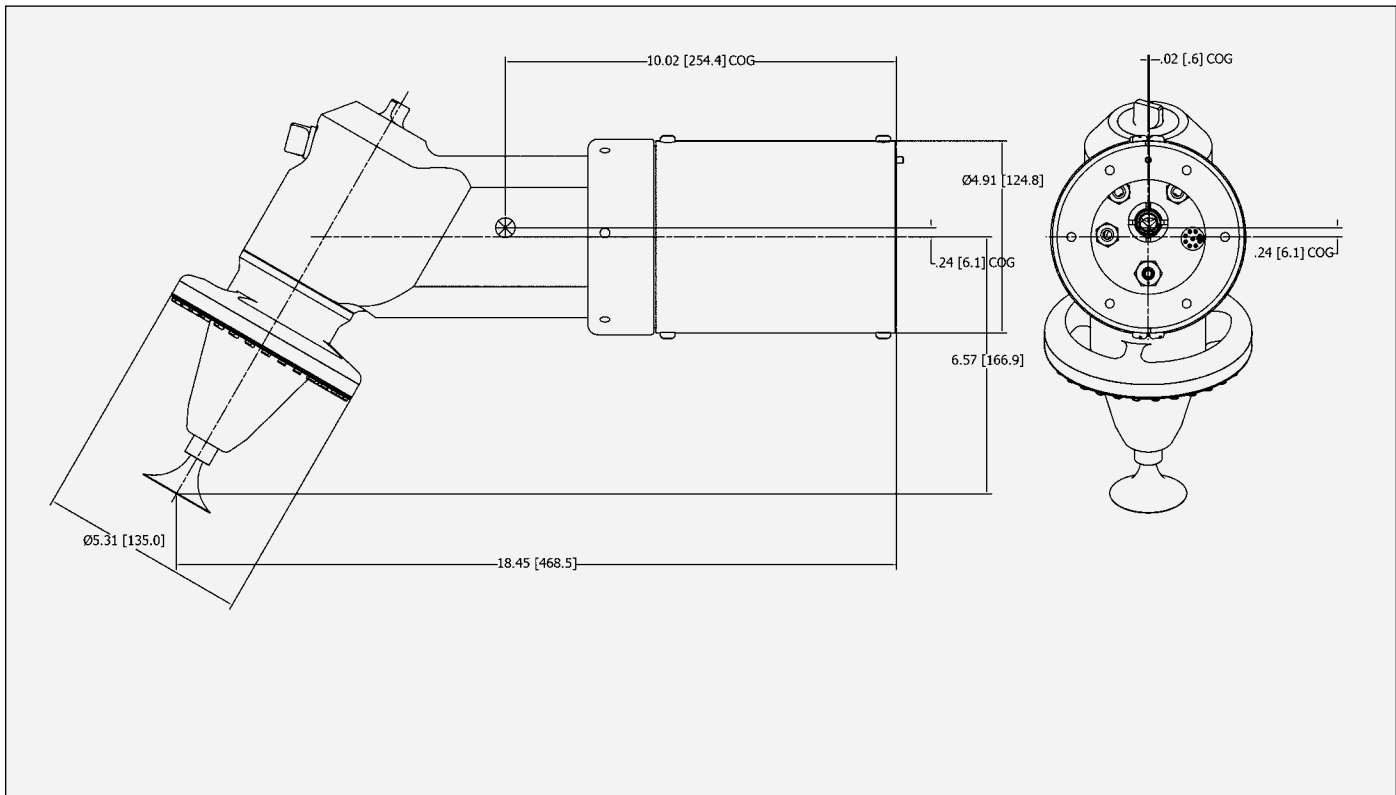
Output Voltage:	100 kV @ μ A
Maximum Output Current:	240 μ A @ 0 kV
Polarity:	Negative

Environmental:

Operating Temperature:	0° C to + 55° C
Storage and Shipping Temperature:	-40° C to + 85° C
Humidity:	95% Non-Condensing

Physical:

Height:	See Figure
Width:	See Figure
Depth:	See Figure
Weight:	4.2 kg (9.26 lbs.)



INSTALLATION



WARNING

► The relevant Safety Standards, as well as the Safety Regulations of the robot manufacturer must be adhered to for the operation of the RPA-2 applicator.

CONNECTING PROCEDURE

1. Attach the robot adapter to the end of the robot.
2. Lay out the applicator powder hose, electrode rinsing air hose, cascade rinsing air hose, and shaping air hose in such a way that neither kinks or twist can likely form
3. Connect the shaping air (SA) to the proper push-in fitting on the robot plate. Clean pneumatic tubing of any debris.
4. Connect the electrode rinsing air (EA) to the robot plate. Clean pneumatic tubes of any debris.
5. Connect the cascade rinsing air (CA) to the robot plate.
6. Connect the ground cable to “GND” fitting on the robot plate. Do Not Over Tighten
7. Connect the other end of the ground cable to a good known earth ground source after installing the cable thru the robot arm.
8. Connect the low voltage cable to the robot plate Align marks and tighten set screw. (See Picture)
9. Install tubing and cables thru the robot arm. Attach robot plate to robot adapter with (4) 77566-24C screws. (3/16 hex key)
10. Connect the low voltage cable to the proper control unit. (See the current MicroPak, Evolver MicroPak, or MicroPak 2e controller service manuals for connection termination.)

Suggested switch setting for MicroPak and Evolver MicroPak only:

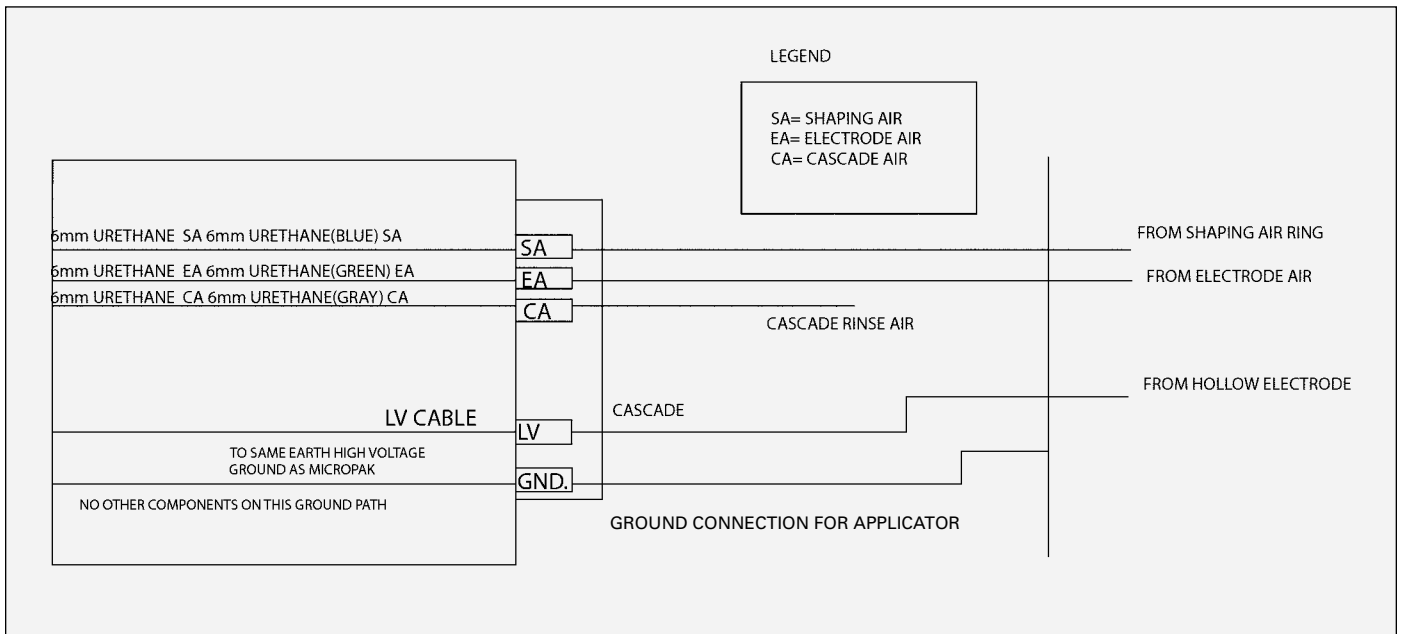
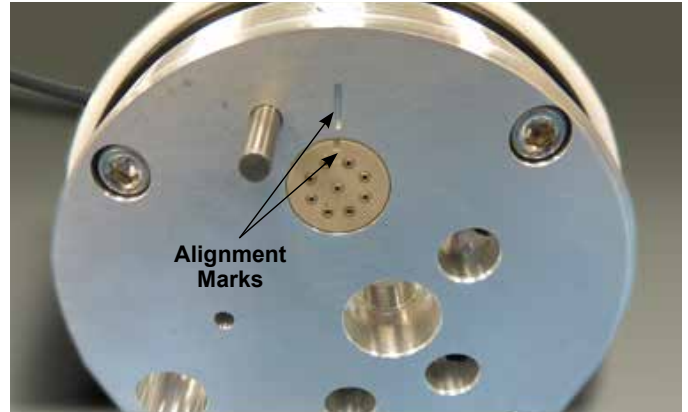
SW-3 (1&2 On)
SW-7 (1 On) (5&6 Off)
11. Powder supply can either be delivered through the dilute phase pump (Venturi) or dense phase pump.
 - A. Dilute phase powder supply hose is connected to the applicator. (Items 51, 52, 53, and 54 are ordered separately for a Venturi Feed application.) “Table A - Upper Powder Tube” in the “Parts Identification” section shows optional parts required for the tube connection. Connect dilute phase powder supply hose (Only if available.)
 - B. Dense phase powder supply hose is connected to the multi-color integrator (MCI). The MCI will use dilution air to dilute the dense phase powder. Dilution air requirements are powder dependent. Connect the MCI to the open threaded connection next to the pneumatic tube connections.

The multi-color integrator will also have the required powder supply lines and one more pneumatic link used for a pinch valve. Refer to “Function and Operation” information from MCI manufacturer’s documentation.
12. Align the 2 pins on the applicator rear plate with the mating holes of the robot plate. Spin the mounting ring to tighten applicator to the robot plate.

Function Check

1. Switch on the high voltage controls. A good setting to start is 20 kV for doing checks.
2. Adjust the high voltage at the control unit.
3. Slowly increase the high voltage. The value of the high voltage display should increase slowly.
4. The maximum nominal output current can be monitored on the applicator control unit.
5. Verify the presence of the high voltage field by means of a high voltage probe.
6. Shaping air, electrode rinsing air, cascade rinsing air and dilution air (If available) are adjusted depending on the application (See “Start-Up” in the “Operation” section).

7. If all tests have been completed positively, the applicator is ready for operation. If malfunctions happen, the error cause can be determined by means of the list in the “Troubleshooting Guide” in the maintenance section.



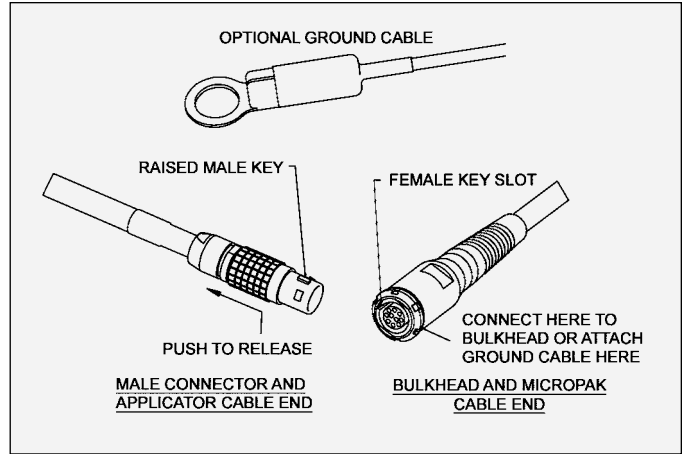
LOW VOLTAGE CABLE INSTALLATION AND REMOVAL

(See “Quick Disconnect Cables” and “Low Voltage Cable On Robot” figures)

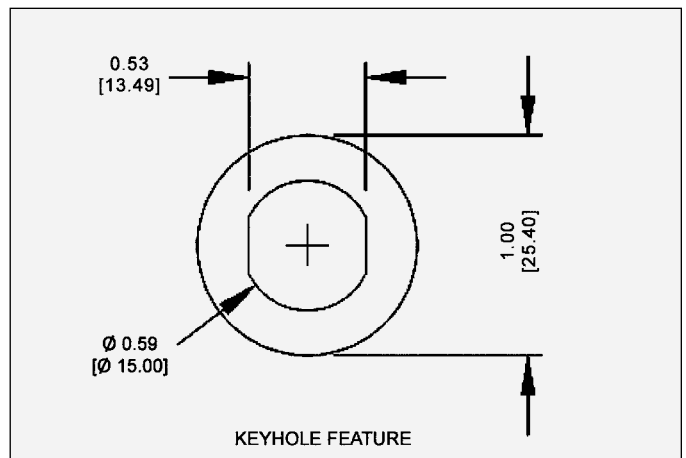
A low voltage cable is provided to send power to the high voltage cascade in the atomizer as well as sending important information during operation back to the MicroPak controls. One piece of the cable is a permanent length of

approximately 60-inches (1.5 meters) from the robot plate end. The connecting Cable can be ordered in various lengths depending on the distance required to reach from the robot arm to the MicroPak controller. The ends of the cables have a male and female quick disconnect end. This provides for a quick and easy removal of the cable at the robot plate if servicing or replacement is required.

It is important the quick disconnect fitting be secured to a good ground source. The A12241-XX or A12433-XX cable is supplied with a ground cable which can be secured to the bulkhead connector and the other end to a known ground source. The cable can also be grounded by attaching the bulkhead connector to a grounded bulkhead plate. The bulkhead plate can be no more than 1/8-inch (3.18mm) in thickness. The bracket should be made as in “Low Voltage Cable On Robot” figure to hold the connector from turning. To mate the connectors, align the raised key section of the cable on the applicator end with the key groove of the cable that goes to the MicroPak. Push the male end into the mating connector until an audible click is heard. Tug on cable to ensure that it is locked in place. To remove this section from the robot plate, remove the applicator. Locate the set screw holding the flanged plastic 9 pin connector. Loosen with a 3/32” hex key wrench. Pull the cable out from the robot plate end. Install new cable in reverse direction, align the 9 pin connector with the alignment mark on the robot plate face and tighten set screw. Torque 5-10 lbs•in (0.56-1.13 Nm).



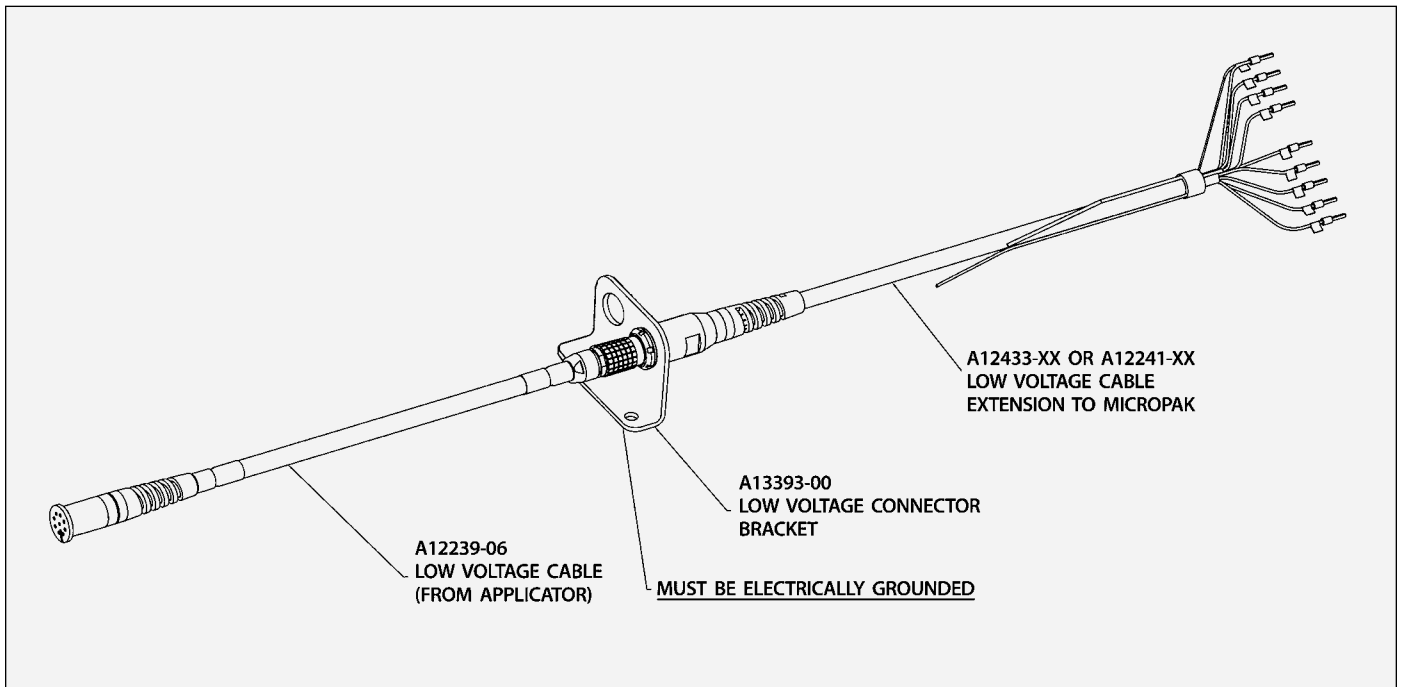
Quick-Disconnect Cables



Bulkhead Cut-Out Diagram

⚠ WARNING

- Cable connector shell must be electrically grounded. Electrical noise or other interference may result.



OPERATION

GENERAL OPERATION

There are several variables that need to be considered when using this applicator. Each one influences the operation. They are:

1. High voltage affects how much the powder is charged. If the kV is set too high, defects will appear. If the kV is set too low, then the powder will not charge and will not stick to the substrate.
2. Shaping air is used to control pattern size. With high amounts of shaping air, the air will propel the powder particles quickly towards the target. This may reduce transfer efficiency.
 - a. Round Spray - Electrode rinsing air provides a cushion of air in front of the deflector and assists in keeping its front face clear. This is usually set at 45-50 SLPM.
 - b. Open Bore Nozzle - set electrode rinsing air 8-10 SLPM. The air helps keep the electrodes clean.
3. Cascade air is used to ventilate the inside of the applicator. The normal setting is between 25 and 50 SLPM.
4. Target distance between the applicator and substrate will influence how big the pattern is. A good starting point is 8-inches.
5. Robot arm speed (TIP speed) is used to influence the rate at which powder is applied.
6. Powder flow rate is the primary influencer of the rate at which powder can be applied.



WARNING

- Make sure that all electrostatically conductive parts within 5 meter of the spray booth are grounded!

START-UP

Adjusting the Powder Output/Powder Cloud

The powder output depends on the powder type, the powder hose length, the powder hose diameter, and the powder pump. The RPA-2 applicator can be used in connection with Venturi pumps and dense phase pumps like (i.e. powder pressure pump).

The operating principle of the injector and the different powder pumps is explained in their corresponding operating manuals.

1. Switch on the power supply.
2. Adjust the powder output.
3. Adjust the shaping air, so that the form of the powder cloud corresponds to the desired size. A good initial setting is 20 SLPM.
4. Adjust the dilution air (if powder applicable) so that the form of the powder cloud is uniform. A good initial setting is 90 SLPM. Lowest dilution air setting will be above 40 SLPM.
5. Adjust the electrode rinsing air flow, so that the desired form of powder cloud is not impaired. A good initial setting is 50 SPLM.
6. Switch high voltage on the control unit. (See applicable service manual for operation of high voltage controls).
7. A good initial setting is 60 kV set point for voltage or 25 μ A for current control.
8. Trigger kV and Powder OFF.
9. The adjustments for high voltage, electrode rinsing air, shaping air, dilution air (if available), and powder output can be left as they are now that powder is triggered off.
10. If work is interrupted such as lunch time, night, etc.. Switch off the high voltage control unit and disconnect the main compressed air supply.

MAINTENANCE

TROUBLESHOOTING GUIDE

General Problem	Possible Cause	Solution
High voltage display shows no value, although the control unit is switched on and high voltage is being called for.	In the applicator:	
	Applicator cable defect	Replace applicator low voltage cable, send in for repair. Check connections for proper contact.
	High voltage cascade defect	Replace high voltage cascade, send in for repair.
	Wrong MicroPak switch settings	Check MicroPak settings (Refer to current MicroPak service manual).
During coating, air flows out of the applicator body.	O-Ring defective or missing on shaping ring	Replace or insert O-ring
	Loose fitting hose	Check fitting - push in hose
The applicator does not spray powder in spite calling for powder flow.	Powder hose, applicator, injector, non-return valve, or throttle on the injector clogged	Carry out corresponding cleaning.
	Insert sleeve on the injector is worn	Replace (See the corresponding Operating Manual of the injector).
	No conveying air: a. Solenoid valve defective	Replace
	Dense phase pump not working	See "Dense Phase Pump" manual.
Powder applicator sprays powder, but the powder does not adhere on the work piece.	Applicator plug, applicator cable, or connection defective	Replace defective part or send in for repair.
	High voltage cascade is defective	Send in the applicator for repair or replace high voltage cascade.
	Plugged electrode	Pneumatically blow backwards through hollow tube.
Applicator sprays powder, high voltage available, but the powder does not adhere on the work piece.	High voltage too low	Increase high voltage on the control unit.
	Work piece not properly grounded	Check the grounding/measure
		Look for loose connections <ul style="list-style-type: none"> • Plastic on conductive component • Loose fitting hinges • Non-conductive coating present on substrate before spraying.

INSPECTING AND CLEANING THE APPLICATOR

1. Blow off the atomizer externally with compressed air.
2. If a solvent wipe is required, use VM&P Naphtha for a final wipe to remove any conductive residue.
3. Clean the atomizer only with a damp rag. Never immerse the components into solvents.
4. Remove any impact fusion on deflector without scratching or scoring the soft plastic surface of the deflector. Impact fusion can be removed with a solvent soaked towel.
5. If impact fusion is not removed, it will shorten the life of the parts and cause defects
6. Blow out all powder hoses with high volume/high velocity air purge during cleaning.



WARNING

► Before cleaning applicator, switch off the control unit. The compressed air used for cleaning must be free of oil, water and other contaminants.



WARNING

► Make sure the large diameter threaded ring (applicator body to shaping ring) is always tightened well. If it is fitted loosely, there is a danger that a discharge may occur with the high voltage, which leads inevitably to damaging the plastic components.



WARNING

► Be careful with nozzle electrode during cleaning and maintenance - danger of injury! Never bend or pull electrode

Cleaning Powder Hose (Venturi Feed)

The powder hose has to be cleaned from the residual powder. The cleaning takes place in the following steps:

1. Strip the powder hose from the connection on the Venturi pump.
2. Blow through the hose manually with compressed air to blow loose powder through to the applicator.
3. Fit the powder hose onto the hose connection on the injector.

Weekly Cleaning and Inspection

1. Remove the electrode holder by removing the shaping air ring. Clean on the inside with compressed air and remove possible powder accumulations.
2. Check for wear or damage on parts that contact powder.
3. Follow "Daily Cleaning" steps.
4. The powder supply is to be filled with powder just before resumption of the operation.

Monthly Cleaning and Inspection

Follow "Daily cleaning" steps.

The atomizer wear parts are to be inspected and replaced if:

- Uneven powder distribution on deflector as compared to starting.
- The spray pattern no longer has a regular form.
- The deflector plate is no longer round or is worn.
- The wedge of the electrode holder wear bar is worn down to the electrode holder.
- Check low voltage cable for cuts, abrasion, and wear.

⚠ WARNING

➤ Regular and conscientious maintenance increases the life span of the RPA-2 applicator and provides for a larger continuous coating quality with reduced defects.

DISASSEMBLING THE APPLICATOR

Before disassembling the applicator, turn off the air supply to shaping air, atomizing air (If available), and rinsing airs.

1. Remove Robot Adapter Covers.

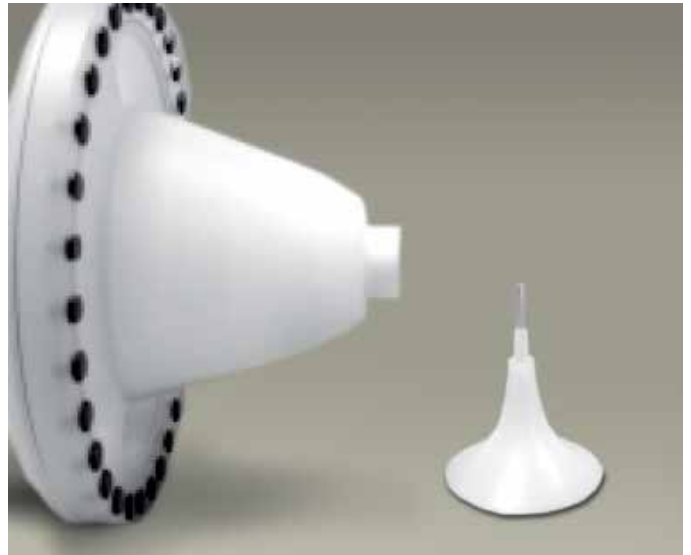


2. Remove Robot Adapter by unthreading large diameter retaining ring.



Applicator with Round Nozzle and Electrode Holder Assembly

3. Unscrew Round Deflector.



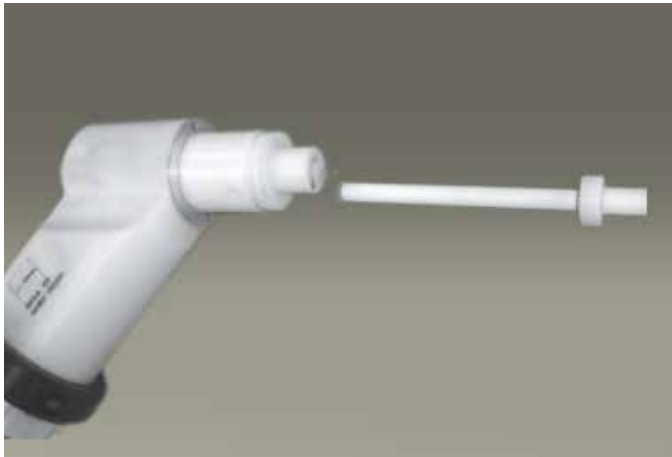
- 4a. Unscrew the Shaping Air Ring.



- 4b. Remove the Shaping Air Ring.



4c. Remove the Nozzle With Power Tube.



5b. Pull Out.



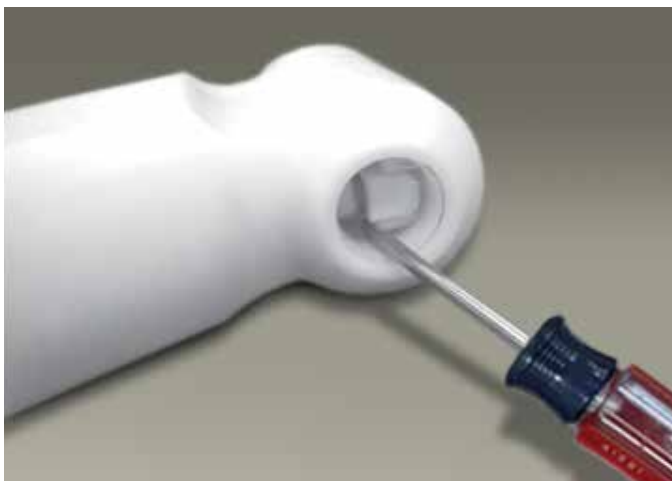
5. Remove rear plugs to view elbows only.



6. View of Lower Powder Tube and Ring Assembly, and O-ring in Correct Orientation.



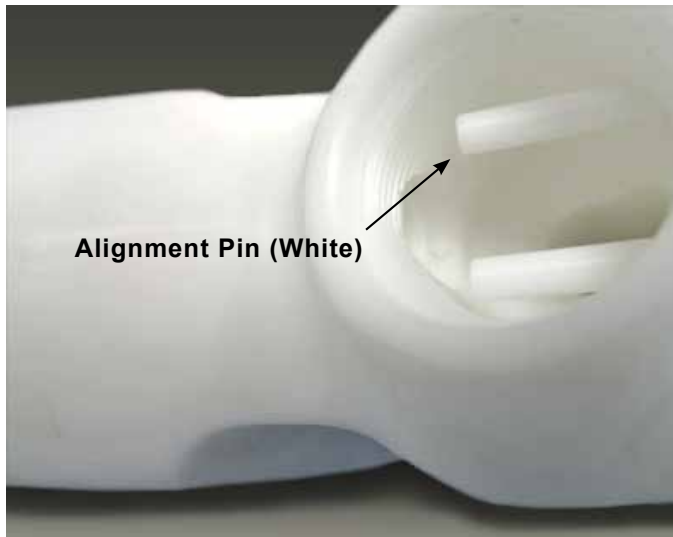
5a. Lift Elbow Off Lower Powder Tube and Ring Assembly.



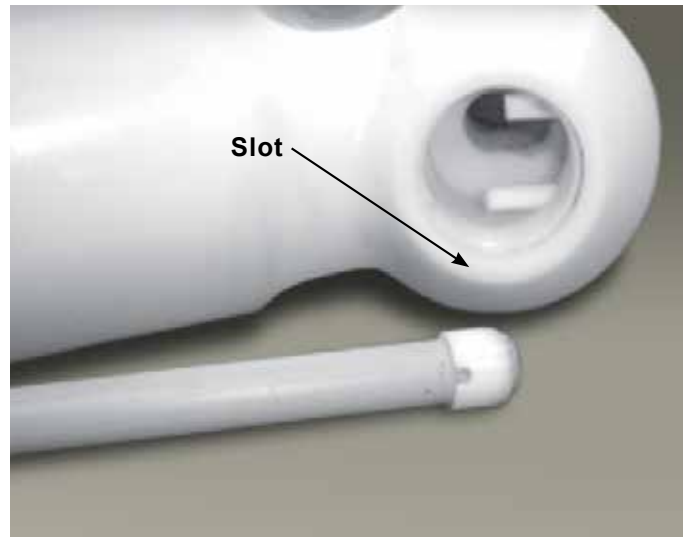
6a. Lift Lower Powder Tube and Ring Assembly.



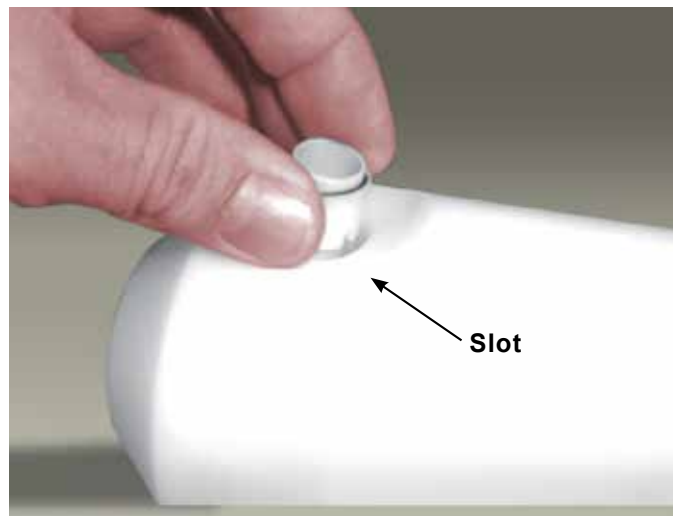
6b. Lower Powder Tube and Ring Assembly Alignment Pin.



6e. View of Lower Powder Tube and Ring Assembly and Slot.



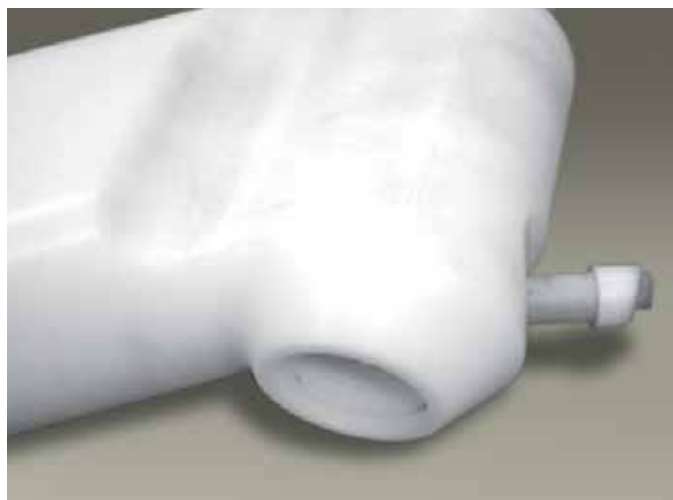
6c. Slot Position.



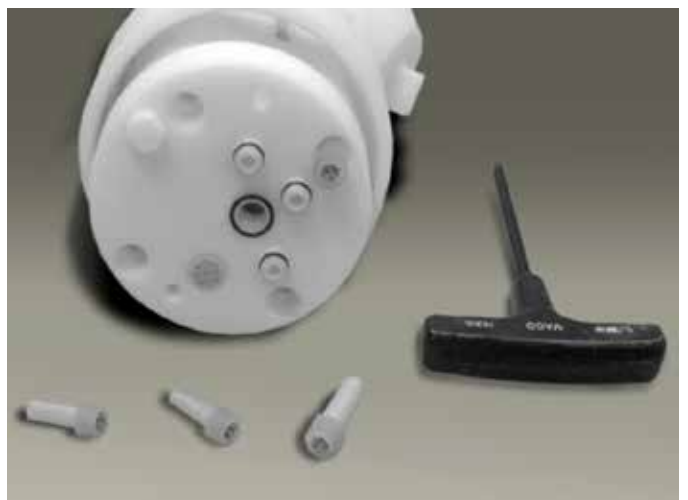
7. Backside of Applicator



6d. Extract Out Top Port.



8. Remove (4) Screws From Applicator Plate (6mm Hex Key).



9. Remove Applicator Plate.



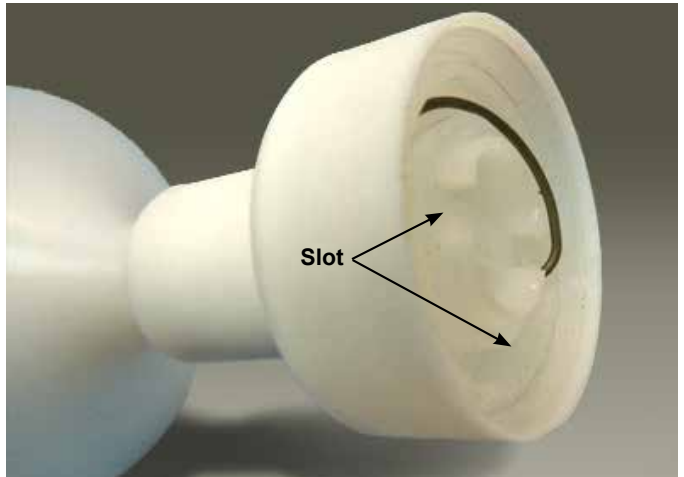
12. Wear Bar and Conductive Seal.



10. Remove Cascade.



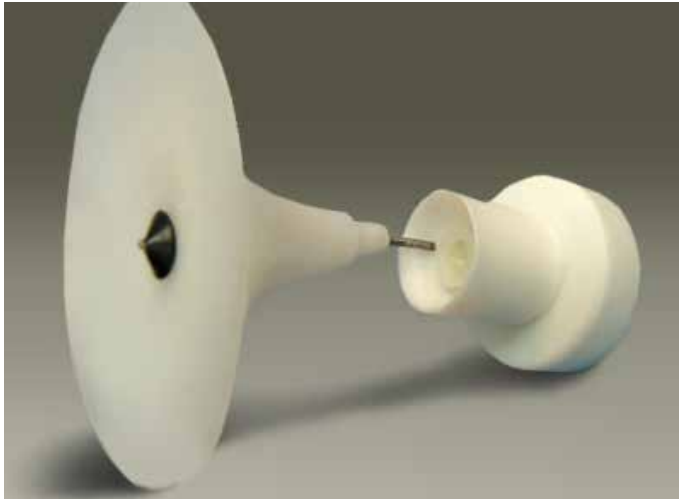
13. Wear Bar Slot (Push Wear Bar Straight In).



11. Nozzle Assembly (A11295-00).

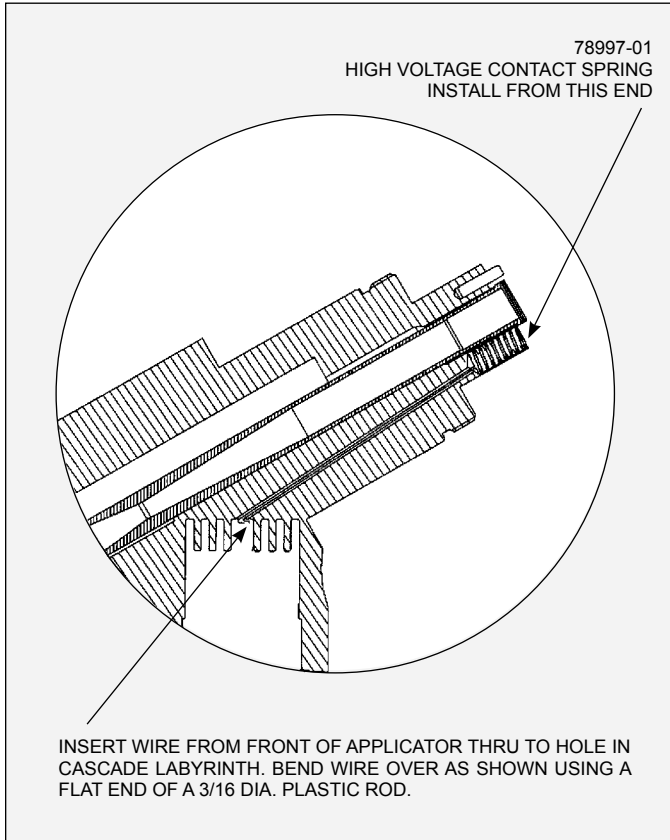


14. Diffuser and Nozzle Holder (Tighten Until Stop).

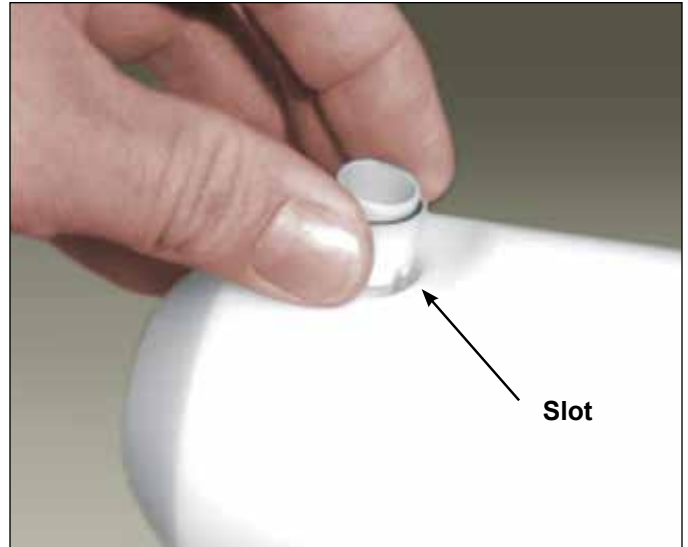


High Voltage Contact Repair

Pull damaged spring and wire out from the front of applicator with pliers. Insert new contact assembly from front of application until spring rests in the bottom of the hole. From inside the cascade labyrinth, use a 3/16" diameter flat-end plastic rod and bend over flat.



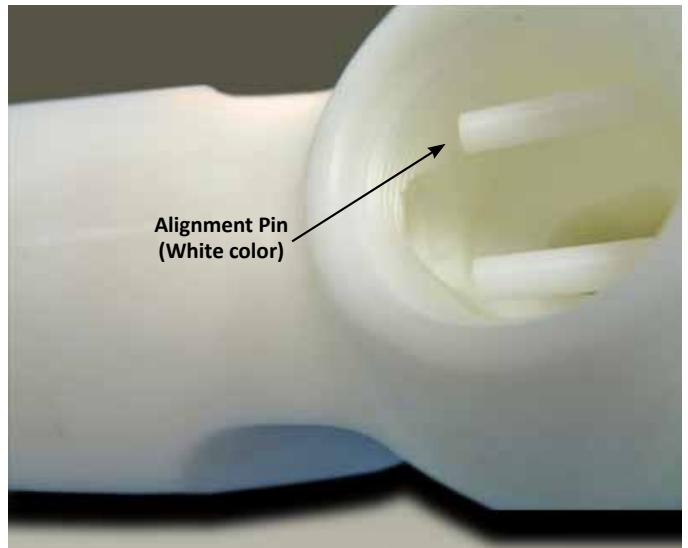
High Voltage Contact Repair



NOTE

➤ The lower powder tube has an alignment slot (see above) which must align with the alignment pin in the gun body for proper fit of components.

- The power hose connection should always be rotated in until the lower powder tube and ring assembly seals in the powder elbow.



ASSEMBLY OF THE APPLICATOR

Assemble the applicator in reverse order of the disassembly.

Assembly Notes:

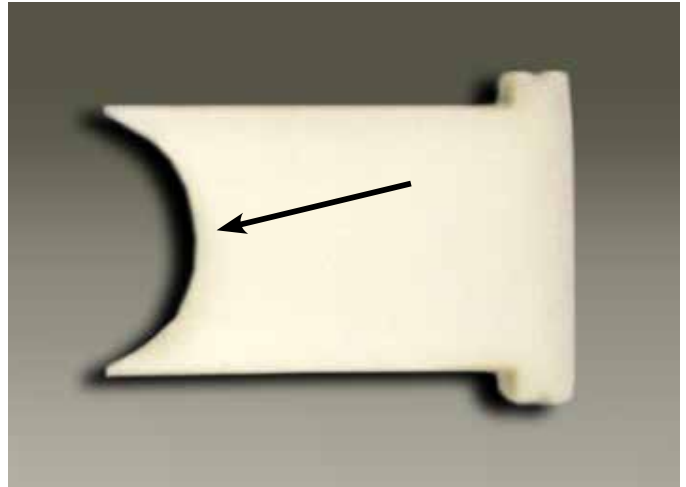
- The lower powder tube and ring assembly elbow, and upper powder tube must align to create a seal. The best method is to assemble all three parts loosely, then tighten the thumb screws, and then tighten the shaping air or shroud.

WHEN TO REPLACE PARTS

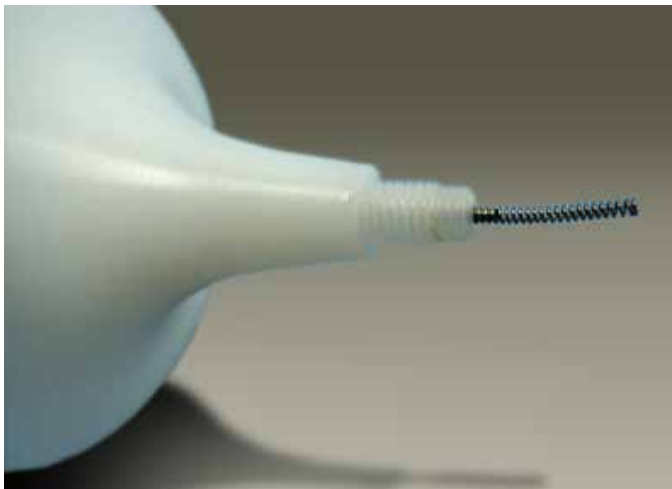
Normal Wear Bar



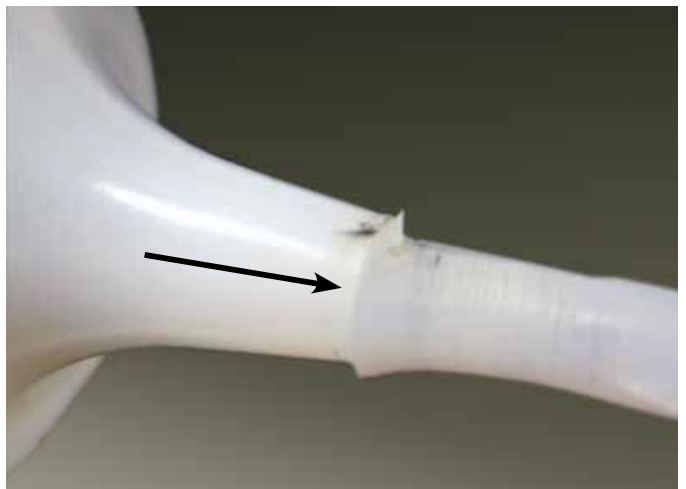
Replace Wear Bar



Normal Deflector



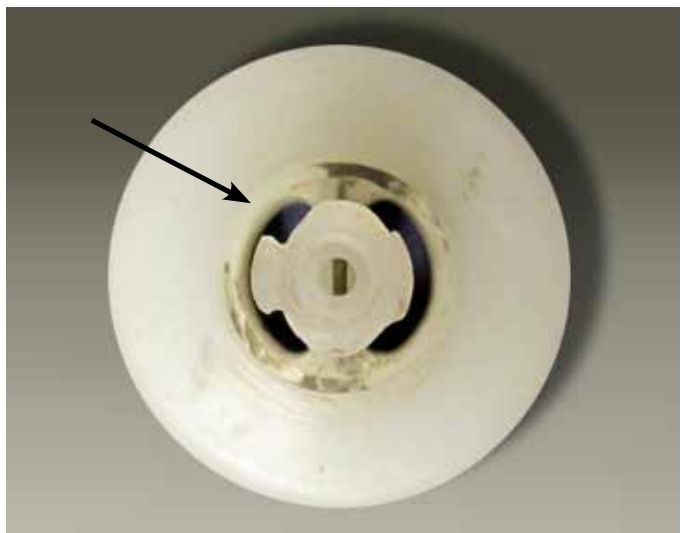
Replace Deflector



Normal Nozzle Holder



Replace Nozzle Holder



HV OVERLOAD VALIDATION

RPA2 Powder Applicator/MicroPak 2e Direct Charge/Current Control

⚠ CAUTION

- When conducting any high voltage testing, the fire protection should be disabled and have the plant fire marshal on hand for all testing.
- This test should be conducted on a regular basis to verify that the safety circuits for the MicroPak 2e and Applicator Cascade are operating properly.
- Qualified Personnel must conduct this test.

Preconditions

1. Verify that proper lockout procedures are followed prior to going into the booth.
2. Verify that high voltage is turned off.
3. Prior to entering the booth, proper personnel protection should be worn. (Per plant protocol.) Personnel should also be grounded.
4. Ensure that all miscellaneous equipment is grounded by using ground straps with clips at both ends.
5. Remove any appropriate covers to inspect equipment.
6. Make sure that the equipment to be tested is clean.
7. Visually inspect that all powder lines are clean and not loaded with powder (i.e., air purged)
8. Visually inspect that all ground wires are attached.
9. Replace covers after inspection is complete and any repairs are completed.

Important - Repair any known equipment problems before proceeding to the next step.

Overload Validation Procedure

1. Disable lockouts as required for testing
2. Verify the process set points per plant documentation and initial commissioning data:

- a. Current set point _____
- b. dv/dt _____
- c. kV Low Limit _____
- d. kV High Limit _____
- e. Max μ A Limit _____

3. The test procedure will require one electrician in the booth, with the zone not locked out, and one technician operating the console.
4. All applicators not being tested must be grounded.
5. Assure the grounding paddle and the Ransburg high voltage test probe are grounded.
6. Turn on high voltage to the applicator being tested.
7. In the booth, verify that there is high voltage present by using a Ransburg High Voltage Probe. Measure the high voltage at the applicator electrode. The readout should be within +/- 5% of the MicroPak 2e actual display reading.
8. In the booth, there are four test procedures to use; each one specific to the parameter being validated.
 - a. To test the dv/dt fault (if enabled), approach the applicator electrode with a grounded paddle (12" x 12") at approximately 2 ft/sec. Stop motion approximately 1 inch from the electrode. The voltage should drop as the paddle approaches the applicator and the MicroPak 2e must fault out with a dv/dt fault. An arc from the paddle to the electrode may occur if the grounded paddle approaches too close to the electrode. An initial dv/dt setting of 15 is typical and the range is 0-60 kV per 100 milliseconds. Adjust lower to increase sensitivity or higher to decrease sensitivity.

NOTE

- Due to the voltage limiting behavior of the current control algorithm, this may be a difficult fault condition to create. It may require dv/dt to be set low (sensitive) with very quick movement of the ground paddle.

- b. To test the kV Low Limit fault, approach the applicator electrode slowly with a grounded paddle (12" x 12") until the corner of the paddle touches the electrode. The voltage should drop as the paddle approaches the applicator and the MicroPak 2e must fault with a kV Low fault. An initial kV Low setting of 15 is typical. Adjust as needed to obtain a useful fault point without creating nuisance faults.

NOTE

► The kV Low Limit fault can easily be tripped by setting the μA Setpoint low and the kV Low Limit to high value. The system lowers the voltage to reduce the current to the low setpoint. If the target current cannot be attained with a voltage that exceeds the kV Low Limit, it will issue a kV Low Fault.

- c. To test the kV High Limit warning, slowly enclose the entire front nozzle assembly of the applicator with a plastic "cap plug" cover (~8" long, 3" diameter, cylindrical, with one end open, one end closed) until the cover stops against the applicator body (sometimes described as "bagging" the electrode assembly). The voltage should rise as the cover encloses the nozzle assembly and prevents current output. When the voltage rises to within 90% of the kV High Limit set point, the MicroPak 2e should display a kV High Warning.

NOTE

► It is easy to create this warning condition by lowering the kV High Limit setpoint to the value of kV Actual.

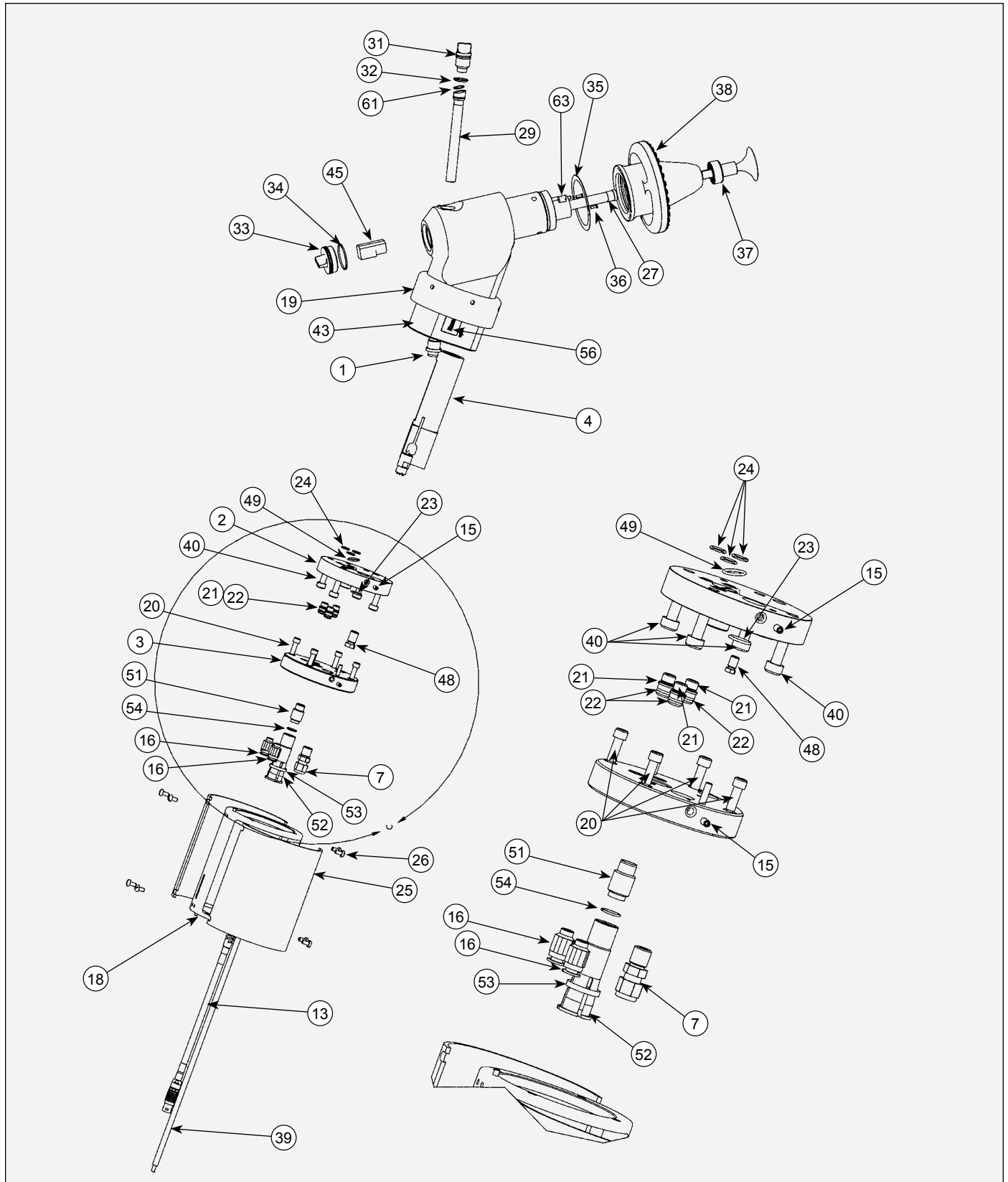
- d. To test the Max μA Limit, set the μA Set value to be greater than the Max μA Limit value. The system will fault when the actual μA reaches the Max μA Limit value.

NOTE

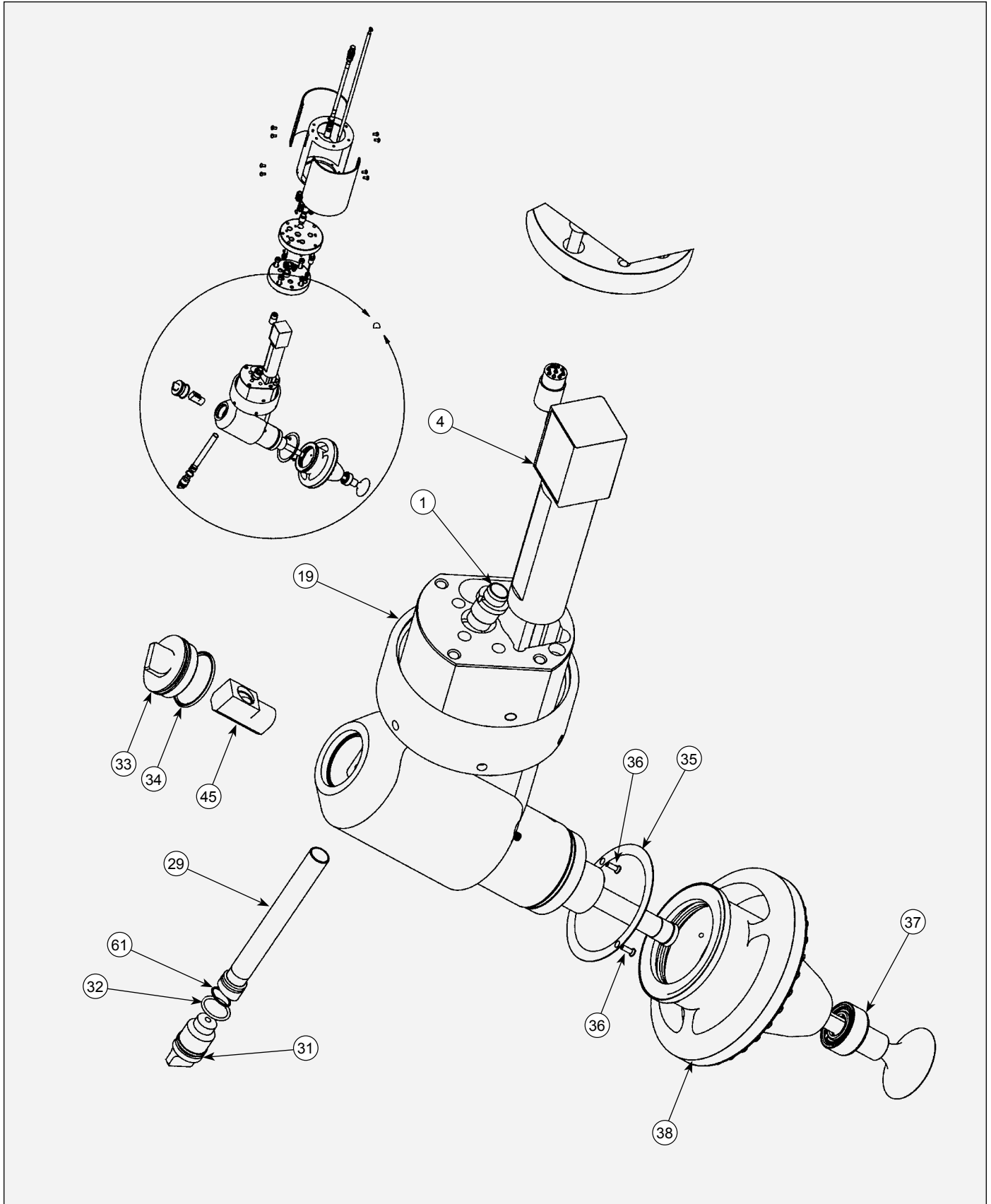
► It is possible to see the Over Current fault when the Max μA Limit and Setpoint are set to the same value if the system ramps too quickly up to the set point.

9. The operator console should indicate a fault/warning consistent with the MicroPak 2e display in each case.
10. Ensure that after each fault, no high voltage is present by checking with the Ransburg high voltage probe.
11. Repeat the test process until all applicators in the zone are tested.
12. When testing is complete, follow lockout procedures before removing all ground straps.
13. When zone is clear of ground straps and personnel, reverse lockout procedure.
14. Activate fire protection system.
15. Regular production may resume.

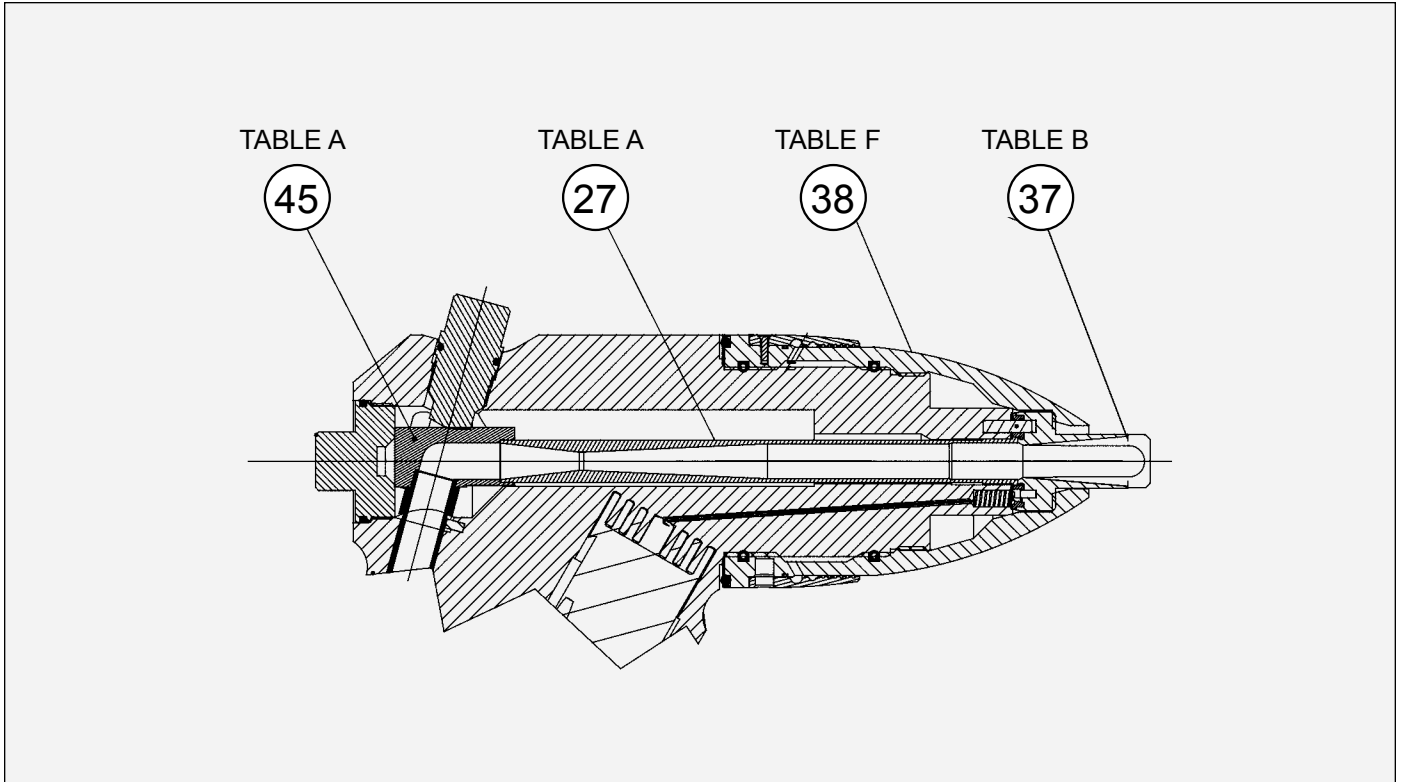
PARTS IDENTIFICATION



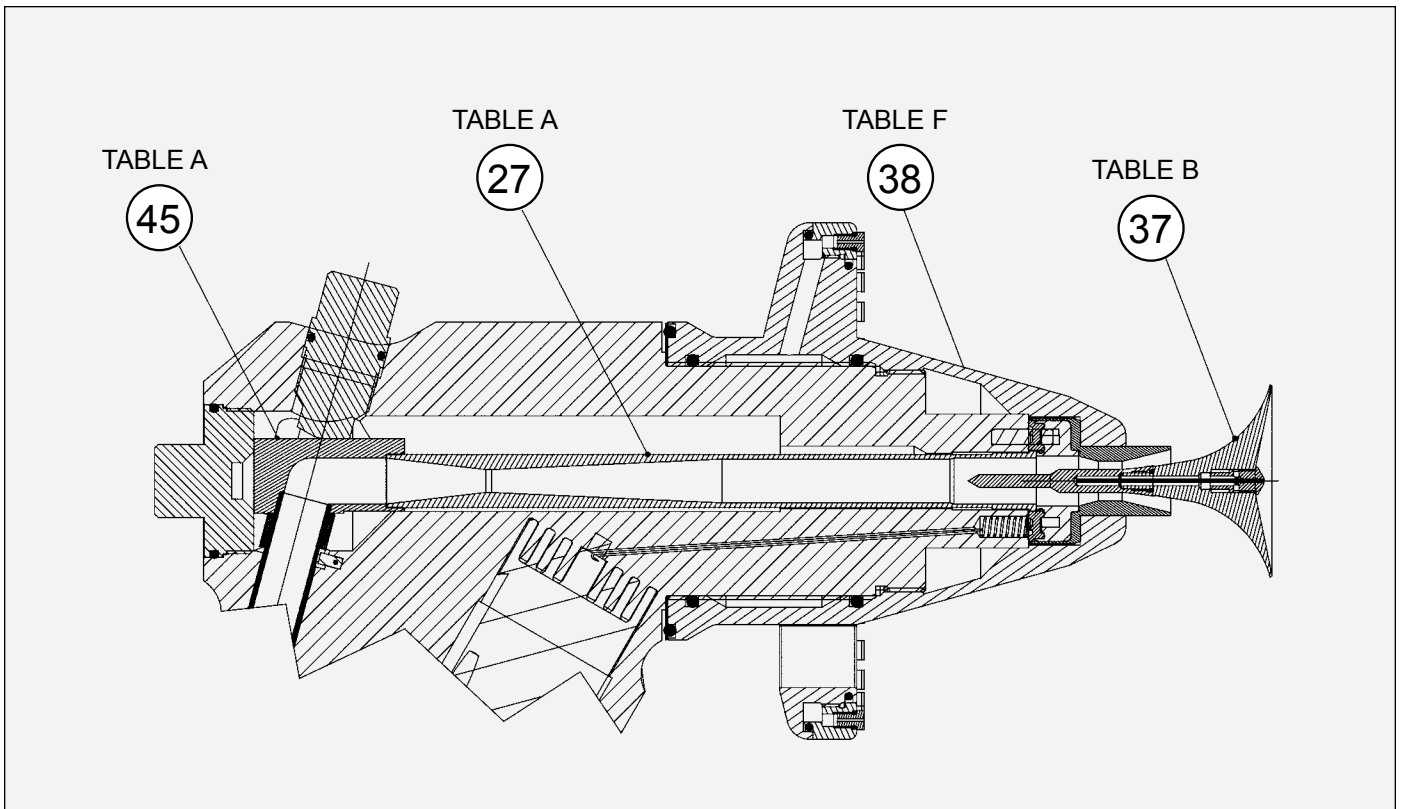
RPA-2 Assembly



RPA-2 Assembly (Cont.)



RPA-2 with Open Bore Nozzle



RPA-2 with Replaceable Elbow, Upper Tube, and Electrode Holder

RPA-2 POWDER APPLICATOR PARTS LIST

Item #	Part #	Description	Qty
1	A12944-00	INLET FITTING	1
2	A12945-00	REAR PLATE	1
3	A12946-00	ROBOT PLATE	1
4	G	ASS'Y. CASCADE	1
7	A10890-02	FITTING, 8 MM ODT X 1/4 BSP	1
13	A12239-06	LOW VOLTAGE CABLE (QUICK DISCONNECT)	1
15	SSF-2052	SET SCREW 3/8 LG X 10-24	2
16	A11129-00	FITTING, 1/4 UNIVERSAL X METRIC ODT PNEUMATIC	3
18	C	ROBOT ADAPTER	1
19	A12948-00	MOUNTING RING	1
20	76566-24C	SCREW, STAINLESS 1/4-20 X 3/4 LG. S.H.C.S.	4
21	A12952-00	AIR STUD, MEDIUM MACHINED	3
22	7554-08	O-RING, VITON	3
23	7554-12	O-RING, VITON	1
24	7554-09	O-RING, VITON	3
25	Z	COVER	2
26	AA	SCREW (M5 X 0.8) NYLON	8
27	A	UPPER POWDER TUBE	1
29	A11571-00	LOWER POWDER TUBE AND RING ASSEMBLY	1
31	A11174-00	TOP PLUG	1
32	A11124-00	O-RING (SOLVENT RESISTANT)	1
33	A11173-00	REAR PLUG	1
34	A11122-00	O-RING (SOLVENT RESISTANT)	1
35	A12894-00	BLANK SPACER	1
36	A13029-00	SCREW (M3 X 0.5 X 10 FLT HD.)	2
37	B	#2 ELECTRODE HOLDER ASSEMBLY	1
38	H	SHAPING AIR RING ASSEMBLY / SHROUD AIR ASSEMBLY	1
39	W	GROUND CABLE ASSEMBLY (RMA-303)	1
40	A11338-00	SCREW, SOC HD CAP M8 X 25MM LG	4
43	A12963-00	RPA GUN BODY ASSEMBLY	1
45	A	ELBOW	1
47	B	OPEN BORE FLAT JET NOZZLE ASSEMBLY	1
48	A12949-01	HOLE PLUG	1
49	79001-09	O-RING, SOLVENT PROOF	1
51	R	POWDER TUBE THREAD ADAPTER	1
52	S	POWDER TUBE FITTING	1
53	T	POWDER TUBE CLAMP	1
54	U	O-RING (12.0 X 1.50 VITON)	1
55	A13001-00	TOOL (NOT SHOWN)	1
56	A13101-00	LABEL	1
61	A11131-00	O-RING (SOLVENT RESISTANT)	1
62	D	LOW VOLTAGE CABLE EXTENSION (NOT SHOWN)	1
63	A11146-00	PLUG	1
64	F	POWER SUPPLY (NOT SHOWN)	1

RPA-2 POWDER APPLICATOR MODEL IDENTIFICATION

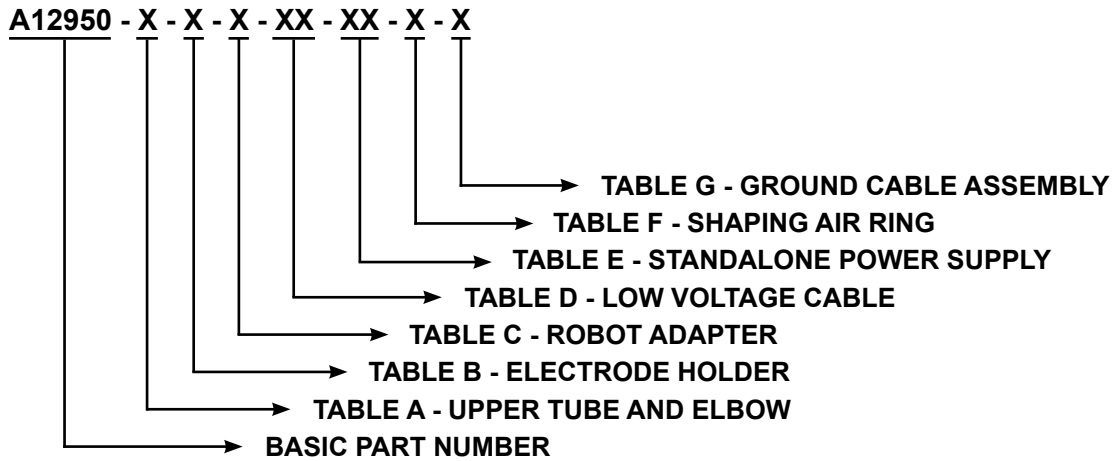


TABLE A - UPPER TUBE AND ELBOW

Dash #	A	A	Description	R	S	T	U
1	A11196-00	A11199-01	UPPER POWDER TUBE - ELBOW (DENSE PHASE)	---	---	---	---
2	A11196-00	A11199-01	UPPER POWDER TUBE - ELBOW (VENTURI PHASE)	A11133-00	A11132-00	A11127-00	A11130-00

TABLE B - ELECTRODE HOLDER

Dash #	B	B	Description
1	A11295-11	---	ELECTRODE HOLDER ASSEMBLY WITH REPLACEMENT WEAR BAR
3	A12052-00	A11138-00	OPEN BORE FLAT JET NOZZLE ASSEMBLY
4	A11295-33	---	ELECTRODE HOLDER ASS'Y W/ REPLACEMENT WEAR BAR (PEEK/TFE)

TABLE C - ROBOT ADAPTER

Dash #	C	Description	Z	AA
0	---	NONE	--	--
1	A12947-00	FANUC ROBOT ADAPTER (P-200/P-250)	A12953-00	A12954-00
2	A12955-00	MOTOMAN ROBOT ADAPTER (PX-2850)	A12953-00	A12954-00
3	A12956-00	MOTOMAN ROBOT ADAPTER (PX-2900)	A12953-00	A12954-00
4	A12958-00	ABB ROBOT ADAPTER (5400 ENHANCED)	A12953-00	A12954-00
5	A13219-00	ABB (5400 SERIES)	A12953-00	A12954-00

TABLE D - LOW VOLTAGE CABLE

Dash #	D	Description	Length
00	---	N/A	---
01	A12241-15	LOW VOLTAGE CABLE- QUICK CONNECT TO MICROPAK (HARD WIRE VERSION END AT MICROPAK)	15 FT.
02	A12241-25	LOW VOLTAGE CABLE- QUICK CONNECT TO MICROPAK (HARD WIRE VERSION END AT MICROPAK)	25 FT.
03	A12241-40	LOW VOLTAGE CABLE- QUICK CONNECT TO MICROPAK (HARD WIRE VERSION END AT MICROPAK)	40 FT.
04	A12241-50	LOW VOLTAGE CABLE- QUICK CONNECT TO MICROPAK (HARD WIRE VERSION END AT MICROPAK)	50 FT.
05	A12241-75	LOW VOLTAGE CABLE- QUICK CONNECT TO MICROPAK (HARD WIRE VERSION END AT MICROPAK)	75 FT.
06	A12433-25	LOW VOLTAGE CABLE- QUICK CONNECT TO MICROPAK (QUICK CONNECT VERSION TO STANDALONE MICROPAK OR MICROPAK 2E)	25 FT.
07	A12433-50	LOW VOLTAGE CABLE- QUICK CONNECT TO MICROPAK (QUICK CONNECT VERSION TO STANDALONE MICROPAK OR MICROPAK 2E)	50 FT.
08	A12433-75	LOW VOLTAGE CABLE- QUICK CONNECT TO MICROPAK (QUICK CONNECT VERSION TO STANDALONE MICROPAK OR MICROPAK 2E)	75 FT.

TABLE E - STANDALONE POWER SUPPLY

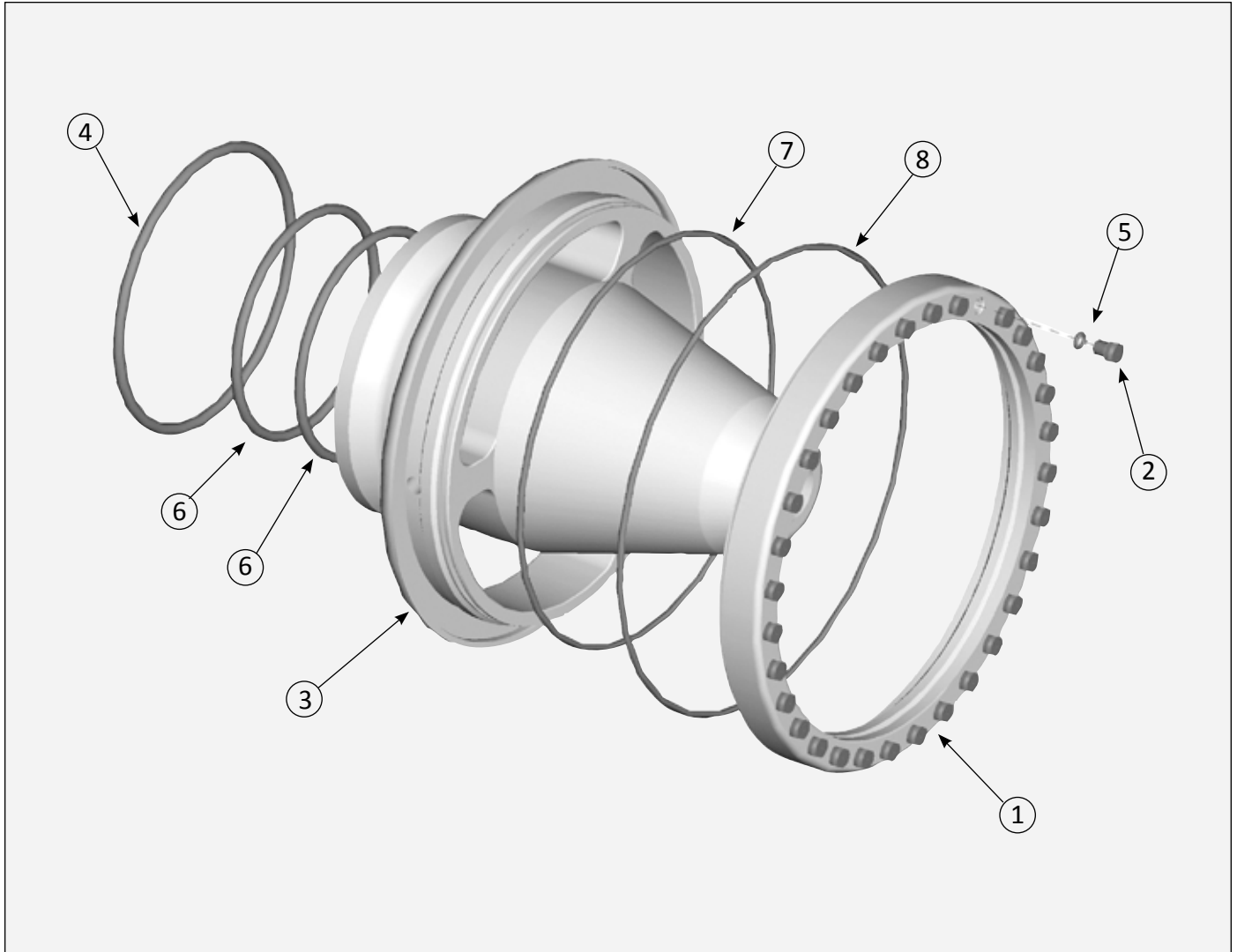
Dash #	F	Description	G - Cascade
00	---	NO MICROPAK HP-505 CASCADE	A10565-00
01	A11789-01	1 MICROPAK & 1 DISCRETE WITH STANDALONE ENCL. HP-505	A10565-00
02	A11789-02	2 MICROPAK & 2 DISCRETE WITH STANDALONE ENCL. HP-505	A10565-00
03	A11789-05	1 MICROPAK & 1 DISCRETE WITH STANDALONE ENCL. HP-404	79010-00
04	A11789-06	2 MICROPAK & 2 DISCRETE WITH STANDALONE ENCL. HP-404	79010-00
05	---	NO MICROPAK HP-404 CASCADE	79010-00
06	A13613-00 10020210	MICROPAK 2 HP-404 DOMESTIC CABLE	79010-00
07	A13613-00 10021210	MICROPAK 2E HP-404 EUROPEAN CABLE	79010-00
08	A13613-00 10022210	MICROPAK 2E HP-404 CHINA CABLE	79010-00
09	A13613-00 10040210	MICROPAK 2E HP-505 DOMESTIC CABLE	A10565-00
10	A13613-00 10041210	MICROPAK 2E HP-505 EUROPEAN CABLE	A10565-00
11	A13613-00 10042210	MICROPAK 2E HP-505 CHINA CABLE	A10565-00

TABLE F - SHAPING AIR RING

Dash #	H	Description
0	---	NONE
3	A11151-00	SHAPING AIR RING (EXTERNAL)
4	A12056-00	SHROUD AIR (OPEN BORE NOZZLE)

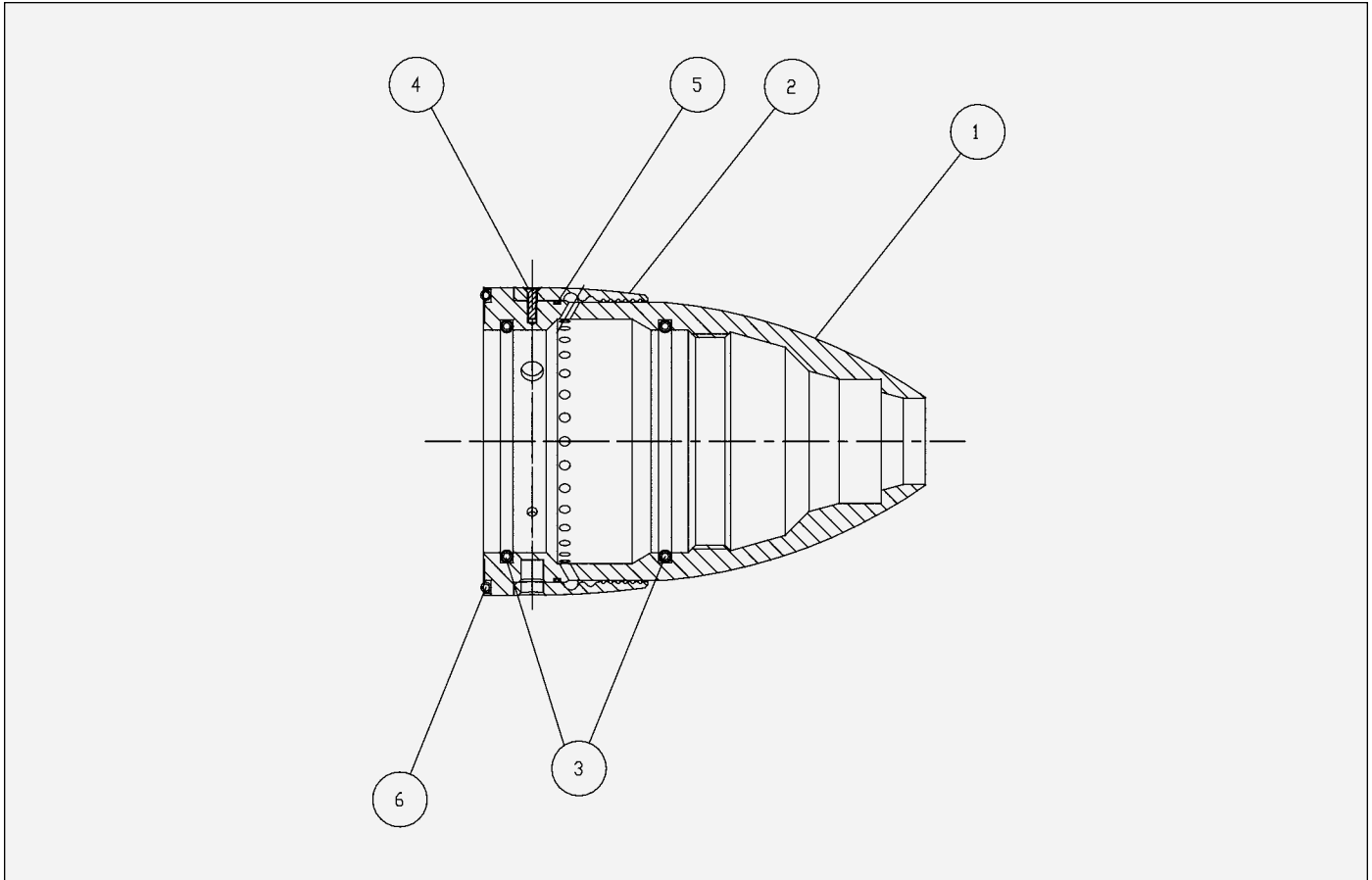
TABLE G - GROUND CABLE ASSEMBLY

Dash #	W	Description
1	A11680-10	CABLE, HIGH VOLTAGE GROUND (10 FT.)
2	A11680-25	CABLE, HIGH VOLTAGE GROUND (25 FT.)
3	A11680-50	CABLE, HIGH VOLTAGE GROUND (50 FT.)
4	A11680-75	CABLE, HIGH VOLTAGE GROUND (75 FT.)
5	A11680-100	CABLE, HIGH VOLTAGE GROUND (100 FT.)



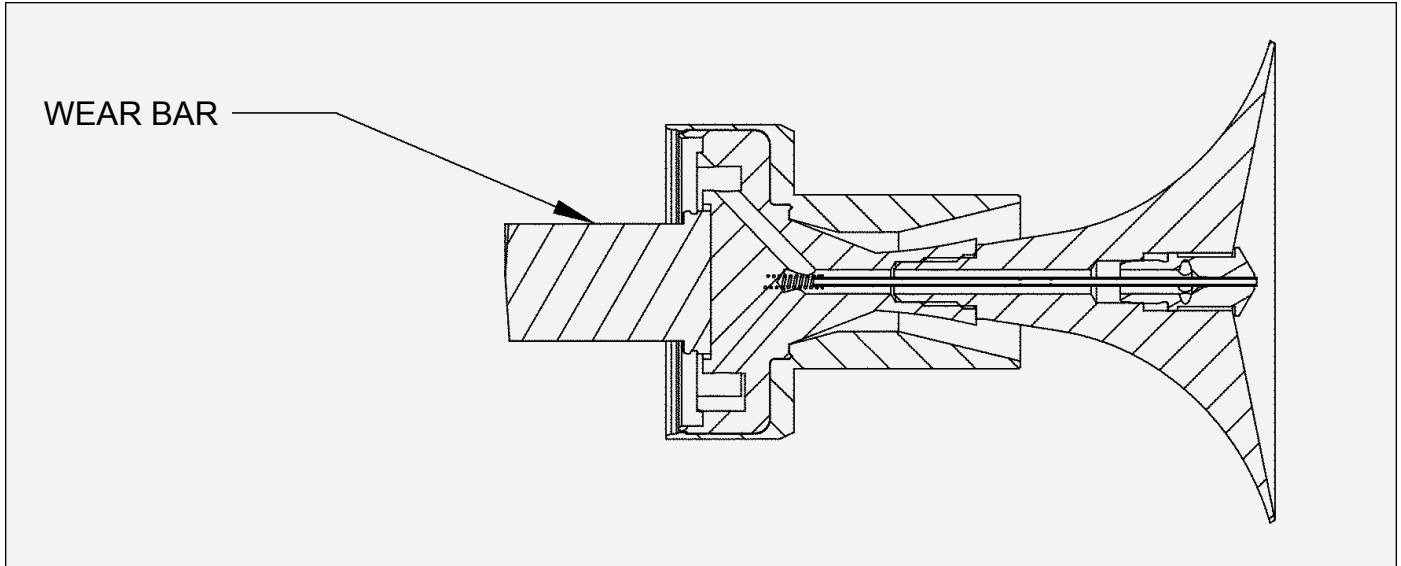
RPA-2 Powder Applicator Shaping Air Cowl (A11151-00)

RPA-2 POWDER APPLICATOR SHAPING AIR RING (A11151-00) - PARTS LIST			
Item #	Part #	Description	Qty
1	A11142-00	THREADED RING (SHAPING AIR)	1
2	A11143-00	SHAPING AIR RING ORIFICE (0,7 MM)	32
3	A11134-00	SHAPING AIR RING	1
4	A11163-00	O-RING	1
5	A11150-00	O-RING	32
6	A11149-00	O-RING	2
7	A11148-00	O-RING	1
8	A11147-00	O-RING	1



Shroud Air (Open Bore Nozzle) (A12056-00)

SHROUD AIR (OPEN BORE NOZZLE) (A12056-00) - PARTS LIST			
Item #	Part #	Description	Qty
1	A12053-00	SHAPING AIR RING SHROUD	1
2	A12054-00	SHAPING AIR RING	1
3	A11149-00	O-RING	2
4	A12055-00	M2 X 8 MM LONG FLAT HEAD SCREW	3
5	7554-126	O-RING	1
6	A11163-00	O-RING	1



ELECTRODE HOLDER MODEL IDENTIFICATION

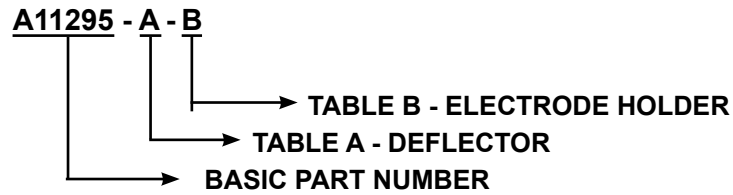


TABLE A - #2 ELECTRODE DEFLECTOR

Dash #	Description	"A"	Qty
1	DEFLECTOR	A11654-00	1
2	NO DEFLECTOR	NONE	NONE
3	DEFLECTOR (PEEK / TFE)	A11654-01	1

TABLE B - ELECTRODE HOLDER

Dash #	Description	Wear Bar	Qty
1	UHMW ELECTRODE HOLDER (REPLACEABLE WEAR BAR)	A11304-00	1
2	UHMW ELECTRODE HOLDER (WEAR BAR NOT REPLACEABLE)	NONE	NONE
3	PEEK ELECTRODE HOLDER (REPLACEABLE WEAR BAR)	A11304-00	1

RECOMMENDED SPARE PARTS

Part No.	Description	Qty
Select Option Below – Open Bore Nozzle Application		
A12052-00	Open Bore Nozzle	1
A11138-00	Conductive Seal	1
7554-126	O-ring	1
A11163-00	O-ring	1
A11149-00	O-ring	1
Select Option Below – Electrode Holder / Deflector Ass'y		
A11295-XX	Electrode Holder Assembly	1
A11138-00	Conductive Seal	1
A11304-00	Wear Bar	1
A11290-01	Electrode Deflector	1
Select Option Below- Parts Common To All Applicators		
7554-08	O-ring	1
7554-09	O-ring	1
7554-12	O-ring	1
79001-09	O-ring	1
A11131-00	O-ring	1
A11130-00	O-ring	1
A11124-00	O-ring (for Top Plug)	1
A11122-00	O-ring (for Rear Plug)	1
A11174-00	Top Plug	1
A11173-00	Rear Plug	1
A12953-00	Cover	1
A12954-00	Screw, Nylon (for A12953-00 Cover)	4
A11129-00	Fitting, 8mm Tube	1
A12894-00	Blank Spacer	1
A13029-00	Screw (M3 x 10 Flt Hd, Nylon)	2
A12949-01	Gun Body Ass'y.	1
A11338-00	Screw (M8 x 25 SHCS Fiberglass) (for Rear Plate)	4
A11196-00	Upper Powder Tube (Dense Phase Application)	1
A11199-01	Top Elbow (Dense Phase or Venturi Application)	1
A11196-03	Upper Powder Tube (Venturi application)	1
A11571-00	Lower Powder Tube and Ring Ass'y	1
A11680-XX	Ground Cable Assembly	1
A12239-06	Low Voltage Cable	1
A12241-XX	Low Voltage Cable extension	1
A12433-XX	Low Voltage Cable extension	1

(Continued on next page)

RECOMMENDED SPARE PARTS (Cont.)

Part No.	Description	Qty
Select Option Below- O-Rings For Shape Air Ring		
A11163-00	O-ring	1
A11150-00	O-ring	1
A11149-00	O-ring	1
A11148-00	O-ring	1
A11147-00	O-ring	1

MANUAL CHANGE SUMMARY

LN-9271-12-R5 - Replaces LN-9271-12.4 with the following changes:

No.	Change Description	Page(s)
1.	Upgrade to new format	All Pages
2.	Update text in image	15
3.	Change part number in first paragraph	16
4.	Update text in bullet point 7 in column 2	17
5.	Delete text in caption for image 7 and remove text in image for step 8	22
6.	Delete images 11 through 14 and correct the color in image for 10	23-24
7.	Add "HV OVERLOAD VALIDATION" section	26-27
8.	Update call outs for exploded view	28-30
9.	Update "RPA-2 POWDER APPLICATOR PARTS LIST"	31
10.	Remove text under page head	32,37
11.	Update table F	34
12.	Change COWL to RING in table head	35
13.	Remove and rearrange item in "RECOMMENDED SPARE PARTS"	38-39

WARRANTY POLICY

This product is covered by Carlisle Fluid Technologies materials and workmanship limited warranty. The use of any parts or accessories, from a source other than Carlisle Fluid Technologies, will void all warranties. For specific warranty information please contact Carlisle Fluid Technologies.

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