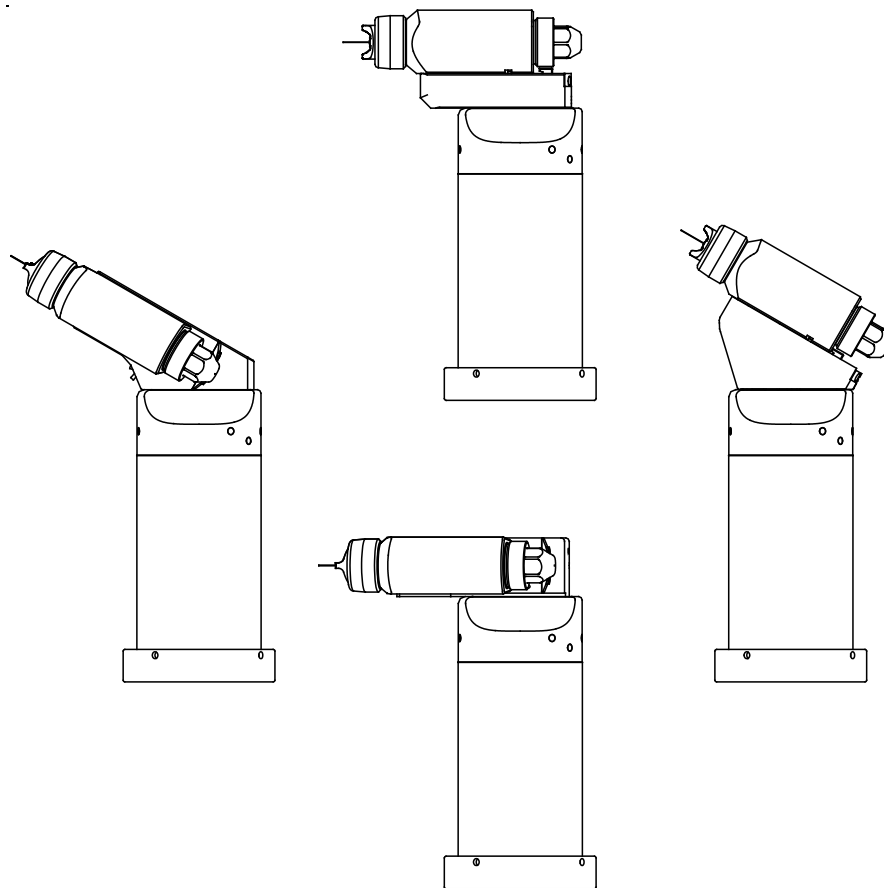

EVOLVER 303™ SOLVENTBORNE ROBOTIC ATOMIZERS



MODEL: A11976-XXX

With
UNILINK
Technology

IMPORTANT: Before using this equipment, carefully read **SAFETY PRECAUTIONS**, starting on page 1, and all instructions in this manual. Keep this Service Manual for future reference.

Service Manual Price: €40.00 (Euro)
\$50.00 (U.S.)

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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.

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

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

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 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 SAFETY STANDARD, LATEST EDITION**, prior to installing, operating, and/or servicing this equipment.

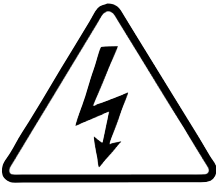





WARNING

- The hazards shown on the following pages may occur during the normal use of this equipment. Please read the hazard chart beginning on page 2.

<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>When using solvents for cleaning:</p> <ul style="list-style-type: none"> • Those used for equipment flushing should have flash points equal to or higher than those of the coating material. • Those used for general cleaning must have flash points above 100°F (37.8°C). <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.</p> <p>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>Never use equipment intended for use in waterborne installations to spray solvent based materials.</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>

<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 / 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>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>Certain material may be harmful if inhaled, or if there is contact with the skin.</p>	<p>Follow the requirements of the Material 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>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

THE RANSBURG ELECTROSTATIC PROCESS

This process is a method for electrostatically applying coatings to objects. A power supply produces a high voltage charge which is supplied to the applicator, creating an electrostatic field between the applicator and the target object. The target is electrostatically grounded through its support which may be either stationary or moving.

A regulated fluid system delivers coating material to the applicator, where it is atomized forming a spray mist. There, under the influence of the electrostatic field, the atomized coating becomes electrostatically charged. The charged particles are attracted to and deposited on the grounded target object. The forces between the charged particles and the target are sufficient to turn overspray around and deposit it on the back surface of the target. Therefore, a higher percentage of the spray is deposited.

EVOLVER 303™ SOLVENTBORNE SPRAY APPLICATORS

The **Evolver 303 Spray Applicators System** will allow for the use of spray applicators or bell applicators with minimal required down-time during the switching process. This system can also operate as a spray applicator system only that later can be upgraded to allow for bell applicators to be used. Lastly, this system can allow a user currently possessing an RMA-303 bell system to use spray applicators as well, with minimal conversion required. The Evolver 303 Solventborne Applicator line consists of both 60° and 90° single and dual-headed 100 kV automatic electrostatic applicators. Developed for use on robots, the Evolver 303 spray applicator incorporates a unique 1/3 turn quick-disconnect spray head and a one piece slide over manifold cover, providing the user an efficient tool for the electrostatic application of coatings.

There are two single head models of the Evolver 303 Applicator (see Figure 1). Each model differs in the applicator to axis orientation of the spray head. These models are:

A11976-0XX 60° Single Head
A11976-1XX 90° Single Head

Two dual-head versions of the Evolver 303 Applicator are also available (see Figure 1). The dual headed applicators are primarily used where high volume fluid delivery is required. The dual headed applicator is available in two different configurations as follows:

A11976-2XX 60° Dual Head
A11976-3XX 90° Dual Head

The Evolver 303 Spray Applicator System consists of four major components:

1. Quick-Disconnect Spray Head
2. Gun Head Mounting Block Assembly
3. Valve Manifold Assembly (Includes the High Voltage Cascade with a Quick-Disconnect Ring)
4. Rear Tubing Manifold Assembly (both English and Metric)

The spray head(s) and valve manifold contain the fluid, air, and high voltage passages. All fluid passages contain stainless steel and/or nylon fittings, compatible with halogenated hydrocarbon solvents. The robot manifold incorporates stainless steel fluid connections.

The high voltage cascade is entirely encapsulated with a solvent resistant epoxy. This cascade generates voltages up to 100 kV fed by a low voltage cable.

There are three sources for the high voltage supply to the Evolver 303 Applicators:

- MicroPak™ Control Unit (LECU5004)
- Stand-alone control/power supply unit (A10406)
- MicroPak™ Control Unit (LECU5004-31)

The MicroPak Power Supply Control unit provides a low voltage signal through the robot manifold to the spray applicator. The high voltage cascade located within the applicator converts the low voltage DC signal to a high voltage electrostatic output.

NOTES

SPECIFICATIONS

Environmental/Physical

Robot/Mounting Compatibility:
All hollow wrist robots

Applicator Control Unit:
MicroPak Control Unit - LECU5004-31
Stand-Alone Control Unit - A10406

Operating Temperature Range: 55°F (12.8°C) - 131°F (55°C)

Weight

Single-Headed:
60° 7.44 lbs. (3.37 Kg)
90° 7.13 lbs. (3.23 Kg)
Dual-Headed:
60° 9.33 lbs. (4.23 Kg)
90° 9.18 lbs. (4.16 Kg)
Manifold:
A11981-XX 5.24 lbs. (2.38 Kg)
(No tubing or cable)

Length

Single-Headed:
60° 15.1 in. (38.4cm)
90° 12.2 in. (36.0cm)
Dual-Headed:
60° 14.2 in. (36.1cm)
90° 11.0 in. (27.9cm)

Tubing Manifolds (English):

A12000-0XXXXXX Air Tubing not included
A12000-1XXXXXX 15 ft.
A12000-2XXXXXX 30 ft.

Tubing Manifolds (Metric):

A11061-0XXXXXX Air Tubing not included
A11061-1XXXXXX 4 1/2m (15 ft.)
A11061-2XXXXXX 9m (30 ft.)

Electrical Requirements

Output Voltage: 30-100 kV

Output Range: 0-85 µA

Paint Flow Rate: Variable to 1500 cc/min.
(Depending on viscosity & configuration)

Trigger Response Time: 134ms Open
318ms Closed

Operating Air Pressures

Atomizing Air: 100 psig (6.9 bar) max.

Fan Air: 100 psig (6.9 bar) max.

Trigger Pilot: 70 psig min./100 psig
(4.8 - 6.9 bar) max.

Dump Pilot: 70 psig min./
100 psig max.
(4.8 - 6.9 bar)

Operating Fluid Pressure:

200 psig
(13.8 bar) max.
100 psig
(6.9 bar) max.
Regulated (with
on-board regulator)

Robot Manifold Tubing Requirements

	Tubing Bundle English	Tubing Bundle Metric
Atomizing Air	5/16" OD Nylon	8mm OD Nylon
Fan Air	5/16" OD Nylon	8mm OD Nylon
Trigger Air	1/4" OD Nylon	6mm OD Nylon
Dump Pilot	5/32" OD Nylon	4mm OD Nylon
Fluid: PTFE	3/8" OD (Non-Shielded)	8mm OD (Non-Shielded)
Dump: PTFE	1/4" ID	8mm ID

EVOLVER 303 APPLICATOR ASSEMBLY

A11976 - **A** **B** **C**

Head Configuration

- 0 = 60° Single Head
- 1 = 90° Single Head
- 2 = 60° Dual Head
- 3 = 90° Dual Head

Body Style

- 0 = For Highly Resistive Materials (Clear Coat)
- 1 = For Conductive Materials (Base/Clear)
- 2 = For Highly Conductive Materials (Base/Clear)

Atomization Technology

- 0 = Conventional Spray
- 1 = HVLP Spray

EVOLVER 303 TUBING BUNDLE ASSEMBLY (ENGLISH)

A12000 - A BB C D

Tubing Bundle Length

- 0 = Air Tubing (Not Included)
- 1 = 15 Ft. Long Tubing Assembly
- 2 = 30 Ft. Long Tubing Assembly

Low Voltage Cable Length

- 00 = No Cable
- 01 = 25 Ft. Low Voltage, Non-Junction
- 02 = 40 Ft. Low Voltage, Non-Junction
- 03 = 50 Ft. Low Voltage, Non-Junction
- 04 = 75 Ft. Low Voltage, Non-Junction
- 05 = 100 Ft. Low Voltage, Non-Junction
- 06 = 15 Ft. Robot to JB / 15 Ft. JB to MicroPak
- 07 = 15 Ft. Robot to JB / 40 Ft. JB to MicroPak
- 08 = 15 Ft. Robot to JB / 60 Ft. JB to MicroPak
- 09 = 15 Ft. Robot to JB / 75 Ft. JB to MicroPak
- 10 = 25 Ft. Robot to JB / 25 Ft. JB to MicroPak
- 11 = 25 Ft. Robot to JB / 50 Ft. JB to MicroPak
- 12 = 25 Ft. Robot to JB / 75 Ft. JB to MicroPak
- 13 = 40 Ft. Robot to JB / 15 Ft. JB to MicroPak
- 14 = 40 Ft. Robot to JB / 25 Ft. JB to MicroPak
- 15 = 40 Ft. Robot to JB / 40 Ft. JB to MicroPak
- 16 = 40 Ft. Robot to JB / 60 Ft. JB to MicroPak
- 17 = 50 Ft. Robot to JB / 40 Ft. JB to MicroPak
- 31 = 25 Ft. Low Voltage, Non-Junction,
Evolver MicroPak
- 32 = 50 Ft. Low Voltage, Non-Junction,
Evolver MicroPak
- 33 = 75 Ft. Low Voltage, Non-Junction,
Evolver MicroPak
- 34 = 100 Ft. Low Voltage, Non-Junction,
Evolver MicroPak
- 35 = 15 Ft. Robot to JB / 15 Ft. JB to Evolver MicroPak
- 36 = 15 Ft. Robot to JB / 40 Ft. JB to Evolver MicroPak
- 37 = 15 Ft. Robot to JB / 60 Ft. JB to Evolver MicroPak
- 38 = 15 Ft. Robot to JB / 75 Ft. JB to Evolver MicroPak
- 39 = 25 Ft. Robot to JB / 25 Ft. JB to Evolver MicroPak
- 40 = 25 Ft. Robot to JB / 50 Ft. JB to Evolver MicroPak
- 41 = 25 Ft. Robot to JB / 75 Ft. JB to Evolver MicroPak

Robot Adapter

- 0 = Adapter (Not Included)
- 1 = Adapter (Fanuc)
- 2 = Adapter (ABB)
- 3 = Adapter (Fanuc-P200)
- 4 = Adapter (KAWASAKI-KE610L)
- 5 = Adapter (MOTOMAN-PX2850)
- 6 = Adapter (MOTOMAN-PX2900)
- 7 = Adapter (B & M LZ2000)

Fiber Optic Cable Length

- 0 = Fiber Optic Cable Not Included
- 1 = 15 Ft. Long Fiber Optic Cable
- 2 = 25 Ft. Long Fiber Optic Cable
- 3 = 50 Ft. Long Fiber Optic Cable
- 4 = 75 Ft. Long Fiber Optic Cable
- 5 = 100 Ft. Long Fiber Optic Cable
- 6 = 40 Ft. Long Fiber Optic Cable

EVOLVER 303 TUBING BUNDLE ASSEMBLY (METRIC)

A11061 - A BB C D

Tubing Bundle Length

- 0 = Air Tubing (Not Included)
- 1 = 4 /12m (15 Ft.) Long Tubing Assembly
- 2 = 9m (30 Ft.) Long Tubing Assembly

Low Voltage Cable Length

- 0 0 = No Cable
- 01 = 25 Ft. Low Voltage, Non-Junction
- 02 = 40 Ft. Low Voltage, Non-Junction
- 03 = 50 Ft. Low Voltage, Non-Junction
- 04 = 75 Ft. Low Voltage, Non-Junction
- 05 = 100 Ft. Low Voltage, Non-Junction
- 06 = 15 Ft. Robot to JB / 15 Ft. JB to MicroPak
- 07 = 15 Ft. Robot to JB / 40 Ft. JB to MicroPak
- 08 = 15 Ft. Robot to JB / 60 Ft. JB to MicroPak
- 09 = 15 Ft. Robot to JB / 75 Ft. JB to MicroPak
- 10 = 25 Ft. Robot to JB / 25 Ft. JB to MicroPak
- 11 = 25 Ft. Robot to JB / 50 Ft. JB to MicroPak
- 12 = 25 Ft. Robot to JB / 75 Ft. JB to MicroPak
- 13 = 40 Ft. Robot to JB / 15 Ft. JB to MicroPak
- 14 = 40 Ft. Robot to JB / 25 Ft. JB to MicroPak
- 15 = 40 Ft. Robot to JB / 40 Ft. JB to MicroPak
- 16 = 40 Ft. Robot to JB / 60 Ft. JB to MicroPak
- 17 = 50 Ft. Robot to JB / 40 Ft. JB to MicroPak
- 31 = 25 Ft. Low Voltage, Non-Junction, Evolver MicroPak
- 32 = 50 Ft. Low Voltage, Non-Junction, Evolver MicroPak
- 33 = 75 Ft. Low Voltage, Non-Junction, Evolver MicroPak
- 34 = 100 Ft. Low Voltage, Non-Junction, Evolver MicroPak
- 35 = 15 Ft. Robot to JB / 15 Ft. JB to Evolver MicroPak
- 36 = 15 Ft. Robot to JB / 40 Ft. JB to Evolver MicroPak
- 37 = 15 Ft. Robot to JB / 60 Ft. JB to Evolver MicroPak
- 38 = 15 Ft. Robot to JB / 75 Ft. JB to Evolver MicroPak
- 39 = 25 Ft. Robot to JB / 25 Ft. JB to Evolver MicroPak
- 40 = 25 Ft. Robot to JB / 50 Ft. JB to Evolver MicroPak
- 41 = 25 Ft. Robot to JB / 75 Ft. JB to Evolver MicroPak

Robot Adapter

- 0 = Adapter (Not Included)
- 1 = Adapter (Fanuc)
- 2 = Adapter (ABB)
- 3 = Adapter (Fanuc-P200)
- 4 = Adapter (KAWASAKI-KE610L)
- 5 = Adapter (MOTOMAN-PX2850)
- 6 = Adapter (MOTOMAN-PX2900)
- 7 = Adapter (B & M LZ2000)

Fiber Optic Cable Length

- 0 = Fiber Optic Cable Not Included
- 1 = 15 Ft. Long Fiber Optic Cable
- 2 = 25 Ft. Long Fiber Optic Cable
- 3 = 50 Ft. Long Fiber Optic Cable
- 4 = 75 Ft. Long Fiber Optic Cable
- 5 = 100 Ft. Long Fiber Optic Cable
- 6 = 40 Ft. Long Fiber Optic Cable

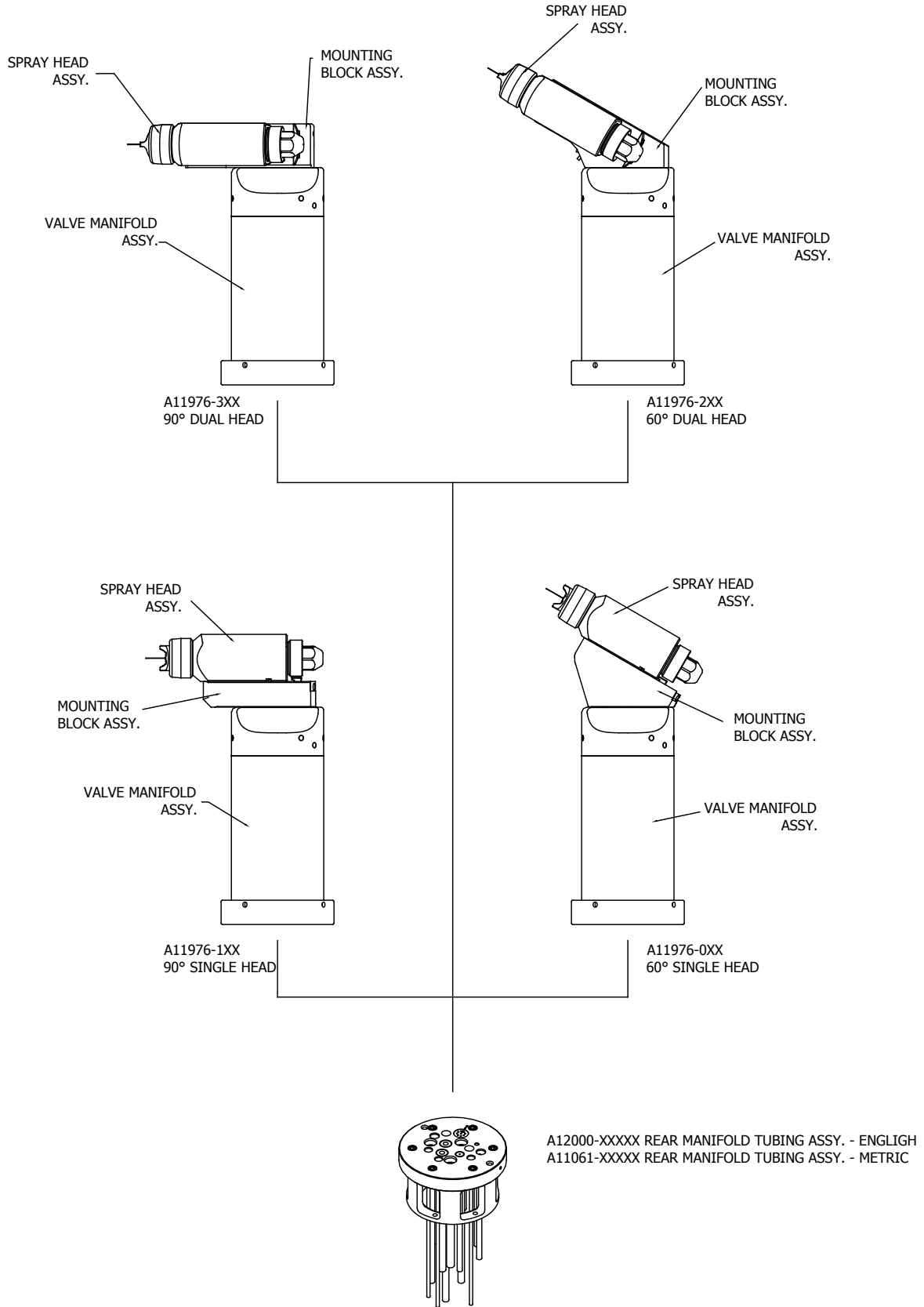


Figure 1: Evolver 303 Solventborne Robotic Applicators

FEATURES

The features of the Evolver 303 Series Applicators include:

- Quick disconnect spray head
- High quality Ransburg air cap and fluid nozzle
- Various adapter plates available to match most robotic mounting configurations
- No external high voltage Cable. The internally mounted high voltage cascade requires only low voltage control wiring
- Less waste to the spray booth with the dump valve located internally next to the feed tube
- Assembly components made of durable engineered resin material for optimum mechanical strength and solvent resistance
- Heavy duty design ensures excellent service life even when subjected to the quick motions of robotic applicators
- Small, light weight package allows for better maneuverability in tight areas
- Negligible maintenance down time with the quick disconnect feature. An atomizer can be exchanged in less than two minutes for off-line maintenance
- Field proven high voltage system
- Dual start, dual pitch air cap retaining ring
- Quick color change capability
- Clean interior design with slip-on shroud
- Internal fan and atomization air control valve, with a mechanically timed trigger sequence
- Color coded air and trigger actuation lines
- Quick Change to a RMA-303 bell applicator

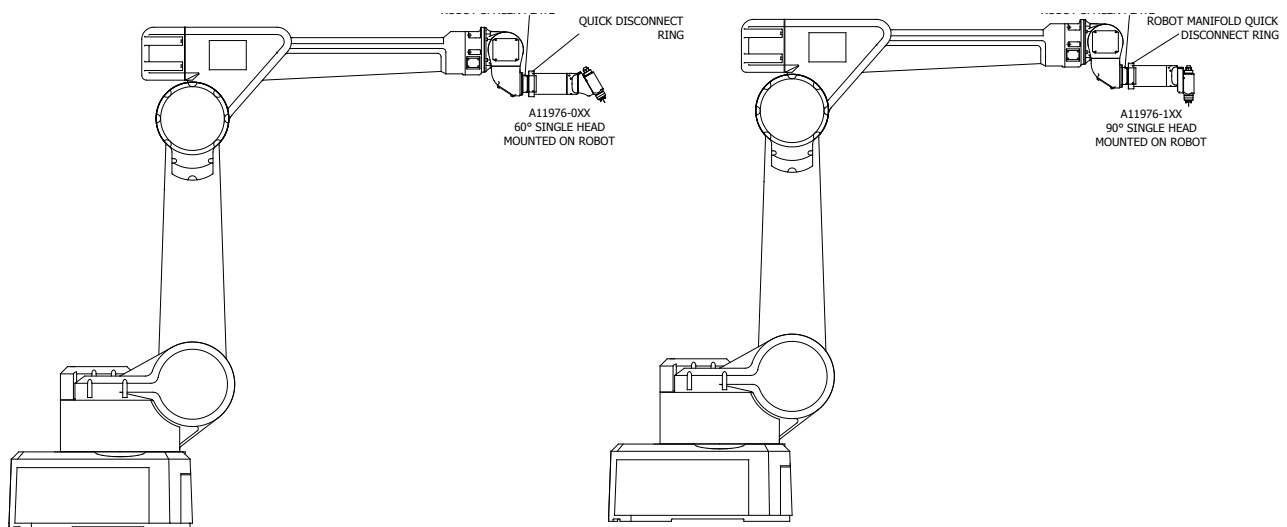


Figure 2: Typical Robotic Applicator Mounting

A11976-XXX EVOLVER SPRAY APPLICATOR ASSEMBLY

The spray applicator assembly is designed to connect to hollow wrist robots. A low voltage control cable is supplied with the tubing bundle to connect the cascade to the MicroPak power supply.

Tool Center-Point

Figure 3 shows the tool center-point information for the four applicators. For dual head applicators, the tool center-point is based upon the convergence point. For the single head applicators it is based upon a 10" target distance. The "Tool Center-Point Comparisons Table" compares the tool center-point of several automatic spray applicators.

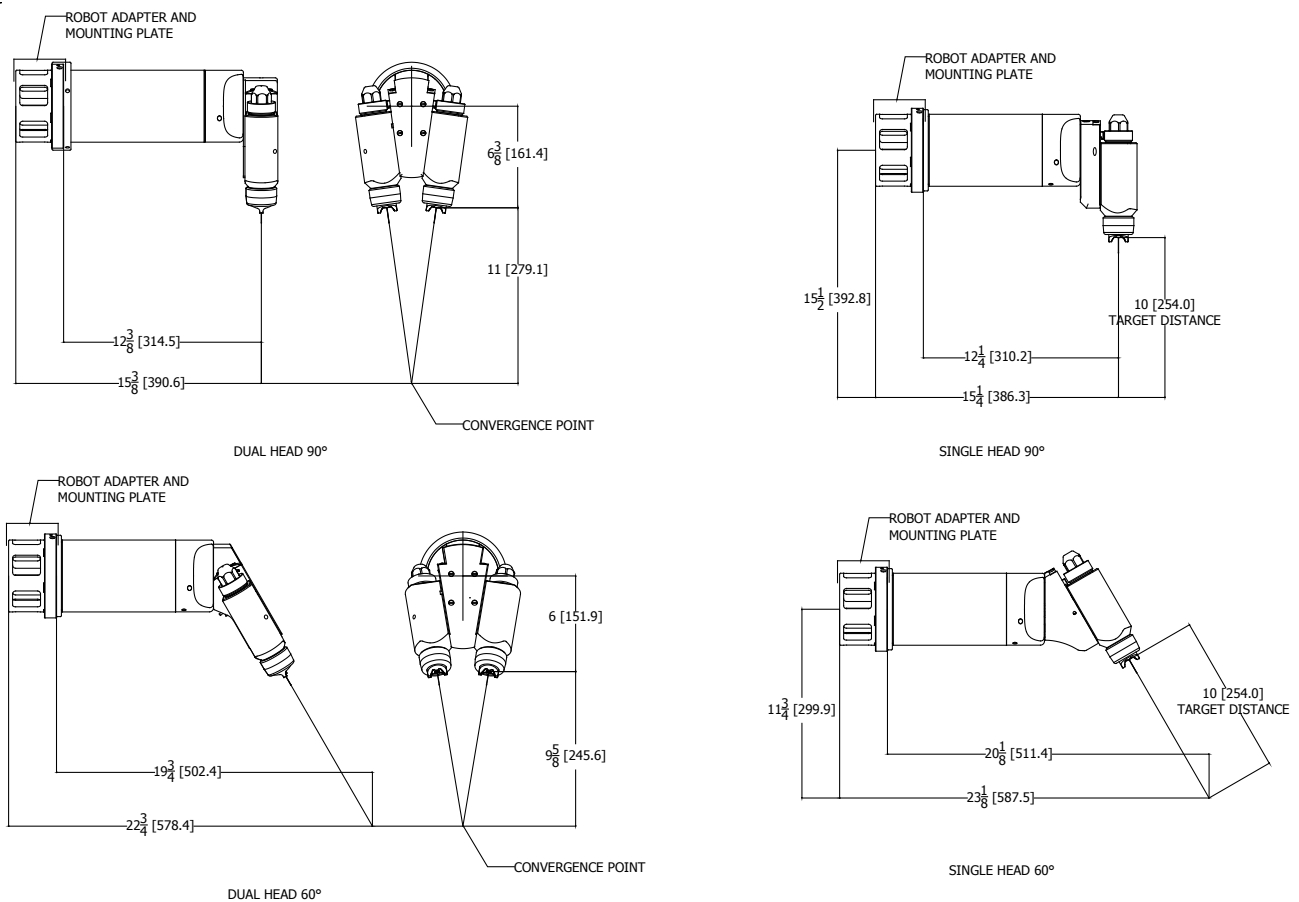


Figure 3: Tool Center-Point

INSTALLATION

EVOLVER 303 ROBOTIC ATOMIZER INSTALLATION

This information is intended **ONLY** to indicate the general installation parameters of this product and, where applicable, its working relationship to other Ransburg system components in typical use. Each installation is unique and should be directed by an authorized Ransburg representative or conducted from the Ransburg installation drawings provided for your particular installation.

POWER SUPPLY ASSEMBLY

Refer to the most current Power Supply Unit manuals for complete information regarding power supply installation.

- MicroPak Control Unit (LECU5004) (for non-FM installations)
- Stand-alone control/power supply unit (A10406) (for FM installations)
- MicroPak Control Unit (LECU5004-31) (for FM installations)

MOUNTING

The Evolver 303 is equipped with a quick disconnect assembly. The quick disconnect feature consists of a robot plate which is permanently attached to the robot through a wrist adapter plate and a mating rear plate which is part of the Evolver 303 Spray Applicator assembly. The applicator is secured to the robot plate with a threaded retaining ring.

ELECTRICAL AND FIBER OPTIC CONNECTIONS

The fiber optic cable is included in the Evolver 303 tubing bundle, but not used. It is there, ready to use, in case a user is using or chooses to use in the future, a bell applicator, which requires the fiber optic cable. The fiber optic connection is made on the back of the applicator's robot plate. The fiber optic cable comes preassembled with connectors that are secured in place by set screws tightened from the side of the robot plate. An adequate ground must be provided to the mounting plate to ensure that fluid fittings, etc. are at ground potential.

FLUID CONNECTIONS

The paint, solvent, and dump fluid tubing are connected on the back of the robot plate with stainless steel compression fittings and PFA tubing. Fluid tubing requirements are shown in the "Signal Identification Tables" in the "Installation" section.

TYPICAL INSTALLATION

Figure 4 shows a typical installation of the Evolver 303 and the wiring installation of the applicator with the MicroPak.

WARNING

- ▶ The power supply **MUST** be located outside the **HAZARDOUS** area (Reference OSHA, NFPA-33, and your insurance company requirements.)
- ▶ User should be aware of, and adhere to, all local fire codes and ordinances.
- ▶ The user **MUST** provide a properly fused disconnect between the power source and the power supply which complies with appropriate codes.
- ▶ Fluid supply must be grounded per NFPA-33.

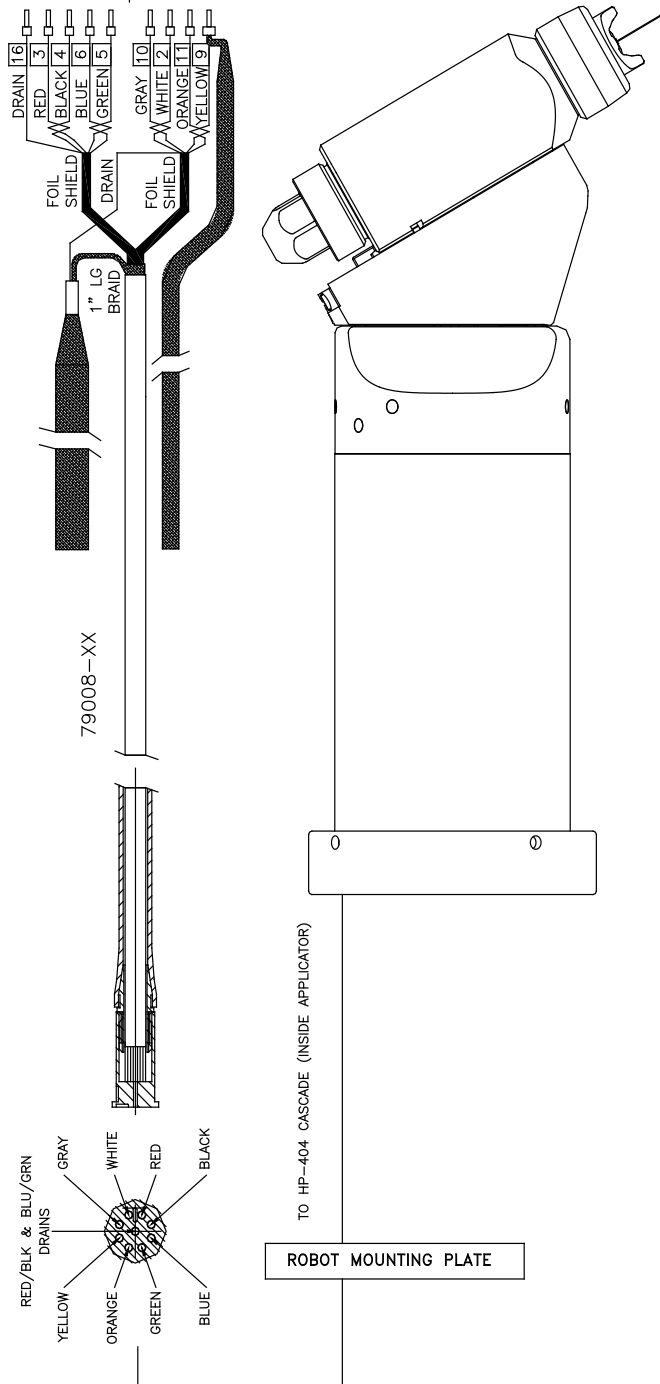
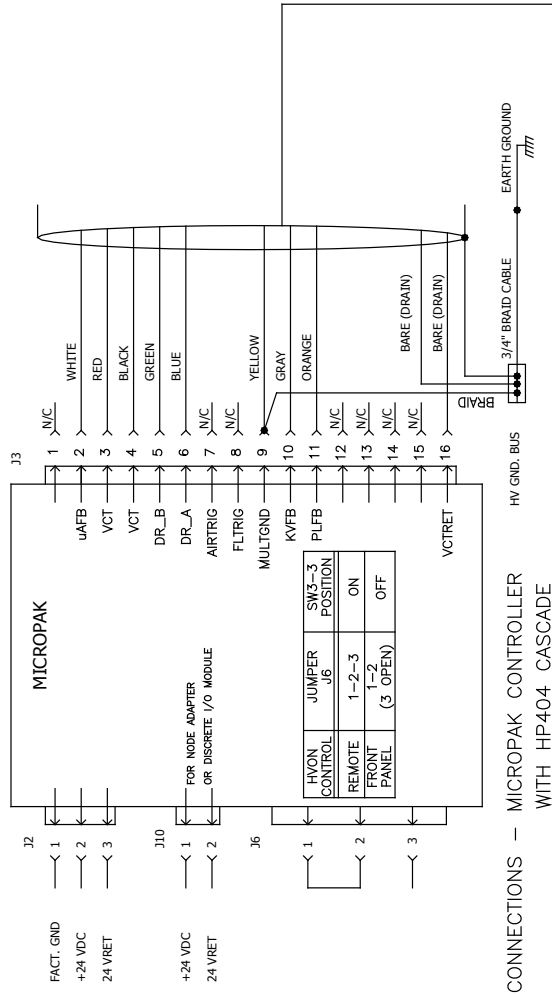


Figure 4: Low Voltage Cable Connections

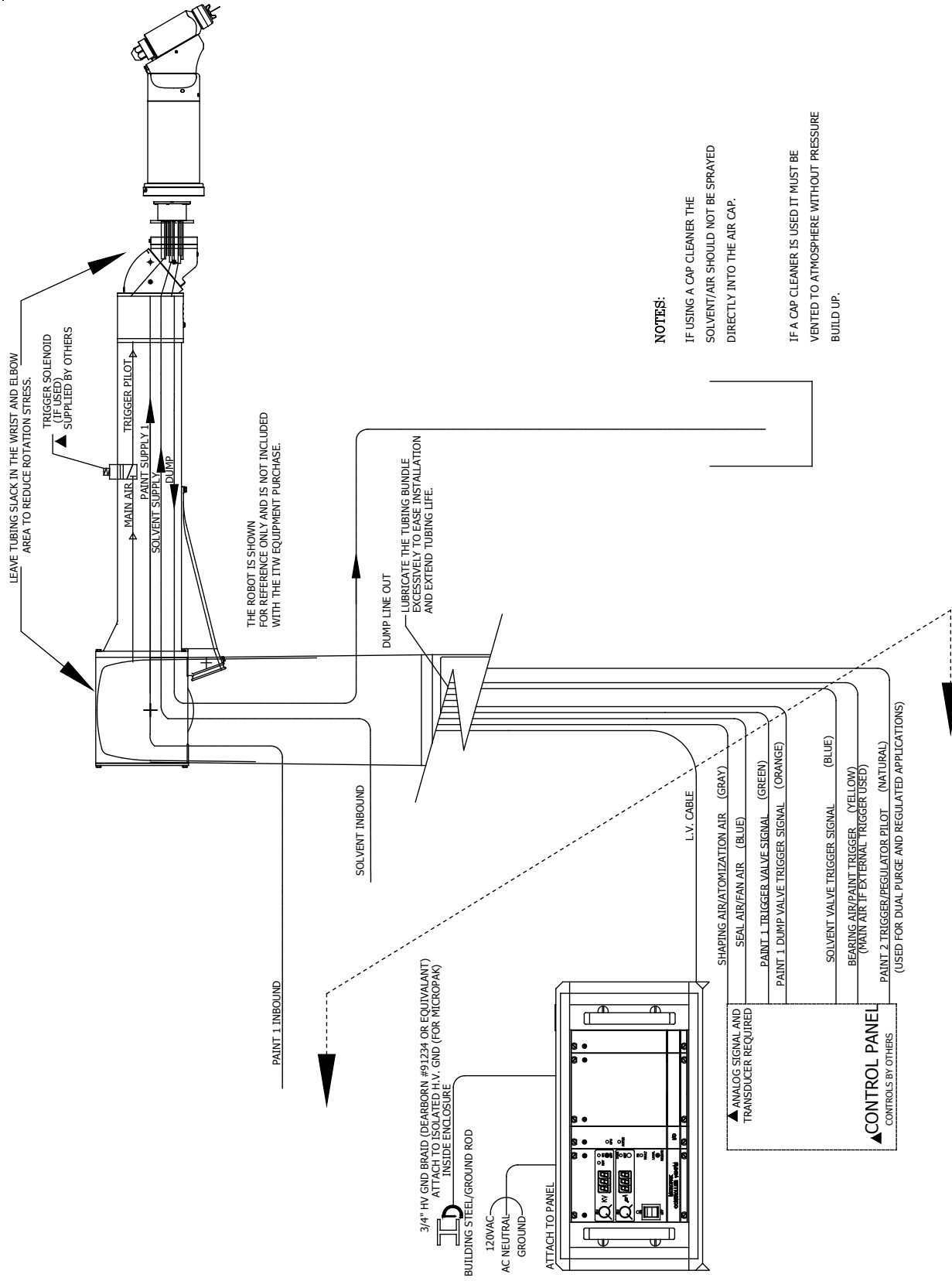


Figure 5: Evolver Spray Applicator Air And Fluid Layout

APPLICATOR AND MANIFOLD ASSEMBLY (See Figures 4, 5, and 6)

The tubing, hose, and low voltage cable come bundled from the factory. Pull the bundle through the robot spacer plate and robot wrist carefully to prevent any cuts on the cable or hoses. Use the six (6) socket head cap screws (76566-24C) included with the rear manifold tubing assembly to attach the rear manifold assembly (A12000 or A11061) to the robot spacer plate (see Table 1).

Connect each signal line as required per "Signal Identification Tables (English and Metric) Tubing Bundles" in the "Installation" section.

Rear Plate Assembly

The rear plate assembly is designed to be at ground potential when mounted to the robot plate component within the tubing bundle assembly. The air and fluid ports are compactly oriented for use in robotic applications. The interior air supplies are ported through the five (5) support rods and also directly tubed to the upper manifold assembly. On the exterior side of the rear plate, the ports are provided with o-ring seals so that the applicator can be quickly mated and secured to the robot plate

Robot Plate

The robot plate is a component of the tubing bundle assembly and intended to be permanently mounted to the robot. A wrist adapter is also available, which matches the robot's mounting configuration. The incoming air lines, fluid lines, low voltage cable, and fiber optic cable are connected to the fittings provided on the back of the robot plate. The rear plate of the applicator assembly is secured to the robot plate with a threaded retaining ring.

Break-Away Feature (Optional)

The Evolver 303 can be converted to have a break-away feature, by replacing the five (5) stainless steel screws with five (5) special designed plastic screws (77524-00). This feature is meant to reduce the damage to the applicator, robot, etc. If a collision occurs, the five (5) plastic break-away

screws fail and the applicator will break free. This will leave the break-away ring and the mounting ring attached to the robot.

Power Supply and Controls

The high voltage cascade located inside the Evolver 303 is controlled by the MicroPak control unit. The low voltage output of the MicroPak is multiplied by the internal cascade to the high voltage level required. This eliminates the need for a high voltage cable. A low voltage cable interconnects the cascade and the MicroPak control. The MicroPak Eurocard format is designed to fit in a conventional 19-inch or 1- inch rack and requires a 24V power input at a maximum 3 amps. The MicroPak and the internal cascade will produce voltages up to 100,000VDC.

The MicroPak is designed to electronically limit current to provide safe operation in a spray booth. The voltage and current draw of the applicator are continuously displayed on the MicroPak control panel. Voltage and over-current limits are adjustable on the front of the MicroPak. MicroPak internal safety circuits will shut down the system on over-current and cable faults.

With additional control modules, all of the functions of the Evolver 303 and MicroPak can be controlled by a programmable controller. A Serial Digital Module pneumatically controls the paint and dump valves located on the applicator. An I/O module provides communication between these modules and the PLC.

The above modules are mounted in one 19-inch rack and interconnected through a common mother board.

Robot Spacer Plate

The robot spacer plate is included with the robot manifold assembly to increase life of the tubing bundle. The extra spacing it provides increases the bend radius of the tubes and decreases the hose or cable stress at the connector.

There is only one way the spacer plate may be assembled to the mounting plate. The spacer plate has an alignment pin that may only engage in one hole position in the robot mount plate. This provides the final position to top dead center of the robot.

Six (6) robot spacer plates shown in Table 1 are available for this product.

TABLE 1 - SPACER PLATES	
Part #	Description
79107-00	ABB Robots
78983-00	Fanuc P155, 145 Robots
79131-00	Fanuc P200 Robot
A10847-00	Adapter (Kawasaki-KE610L)
A10848-00	Adapter (Motoman-PX2850)
A10849-00	Adapter (Motoman-PX2900)
A10851-00	Adapter (B & M LZ 2000)

LOW VOLTAGE CABLE INSTALLATIONS

For installations utilizing the LECU5004-XX MicroPak power supply, connect the low voltage cable (79008-XX) from the robot manifold assembly to the LECU5004-XX MicroPak controller or junction box. If connecting to a junction box, use a junction cable (77062-XX) to make the connection from the junction box to the LECU5004-XX MicroPak. Make connections as shown in Figure 4.

For installations utilizing the A10406-XX Evolver MicroPak power supply, connect the low voltage cable (A11353-XX or A11356-XX) from the robot manifold assembly or junction box to the receptacle on the rear of the A10406-XX power supply. To

maintain FM Approval, this cable must be secured to the stress relief bar on the rear of the power supply. (See "A10406-XX Evolver MicroPak Power Supply" manual for further information on connecting the low voltage cable.)

NOTE

- ▶ With the exception of fluid, dump, and bearing air/paint trigger, all other pilot and air supply lines should be bulkheaded and their diameters increased one nominal size. For example: atomization air should be increased to a 1/2" ID (8mm) from bulkhead plate to the volume booster.

NOTE

- ▶ If the length of the fan or atomization air lines exceeds 30 ft. (10m), the lines must be upsized to 1/2" ID (12mm for metric).

NOTE

- ▶ For the dipswitch settings for the Evolver 303, reference the current MicroPak service manual.

NOTE

- ▶ Leave 12-24 inches (.30m-.61m) of extra length on all lines to prevent extreme tension being applied to these lines during robot movement. This increases tubing bundle life.

CAUTION

- ▶ Do not exceed 100' combined length of the low voltage cables.

WARNING

- ▶ If a non-explosion proof junction box/terminal strip is used, it must be located outside the hazardous area.

WARNING

- ▶ Install and route the hoses and cable so that they are **NOT** exposed to temperatures in excess of 120° F. Ensure that all hose and cable bends are **NOT LESS THAN** a 6-inch (15cm) radius and are not subjected to more than 360° of torsional twist. Failure to comply with these parameters could cause equipment malfunctions that might create **HAZARDOUS CONDITIONS!**

SIGNAL IDENTIFICATION TABLE (ENGLISH)

Abbr.	Description	Color	Tubing Material	Tubing Size
B.A/P.T	Bearing Air (Paint Trigger)	Yellow	Nylon	1/4" OD X .170" ID
B.A RTN	Bearing Air Return	Yellow	Nylon	5/32" OD X .106" ID
BRK	Brake Air	Orange	Nylon	1/4" OD X .170" ID
DL	Dump Line	Natural	PTFE	5/16" OD X .250" ID
F.O	Fiber Optic Cable	Natural	Polyethylene	1/4" OD (jacket)
LV	Low Voltage Cable	Black	N/A	N/A
P	Paint In	Natural	PTFE	3/8" OD X .250" ID
PT	Paint Trigger	Green	Nylon	5/32" OD X .106" ID
DT	Dump Trigger	Silver	Nylon	5/32" OD X .106" ID
SA.I/A.A	Inner Shaping Air (Atom, Air)	Blue	Nylon	5/16" OD X .250" ID
SOL	Solvent In	Natural	Nylon	1/4" OD X .170" ID
SA.O/F.A	Outer Shaping (Fan Air)	Gray	Nylon	5/16" OD X .250" ID
ST/RP	Solvent Trigger Signal	Blue	Nylon	5/32" OD X .106" ID
T.A	Turbine Air	Green	Nylon	3/8" OD X .275" ID

SIGNAL IDENTIFICATION TABLE (METRIC)

Abbr.	Description	Color	Tubing Material	Tubing Size
B.A/P.T	Bearing Air (Paint Trigger)	Yellow	Nylon	6mm OD X 4mm ID
B.A RTN	Bearing Air Return	Yellow	Nylon	4mm OD X 2.7mm ID
BRK	Brake Air	Orange	Nylon	6mm OD X 4mm ID
DL	Dump Line	Natural	PTFE	10mm OD X 8mm ID
F.O	Fiber Optic Cable	Natural	Polyethylene	1/4" OD (jacket)
LV	Low Voltage Cable	Black	N/A	N/A
P	Paint In	Natural	PTFE	8mm OD X 6mm ID
PT	Paint Trigger	Green	Nylon	4mm OD X 2.7mm ID
DT	Dump Trigger	Silver	Nylon	4mm OD X 2.7mm ID
SA.I/A.A	Inner Shaping Air (Atom, Air)	Blue	Nylon	8mm OD X 6mm ID
SOL	Solvent In	Natural	PTFE	6mm OD X 4mm ID
SA.O/F.A	Outer Shaping (Fan Air)	Gray	Nylon	8mm OD X 6mm ID
ST/RP	Solvent Trigger Signal	Blue	Nylon	4mm OD X 2.7mm ID
T.A	Turbine Air	Green	Nylon	10mm OD X 8mm ID

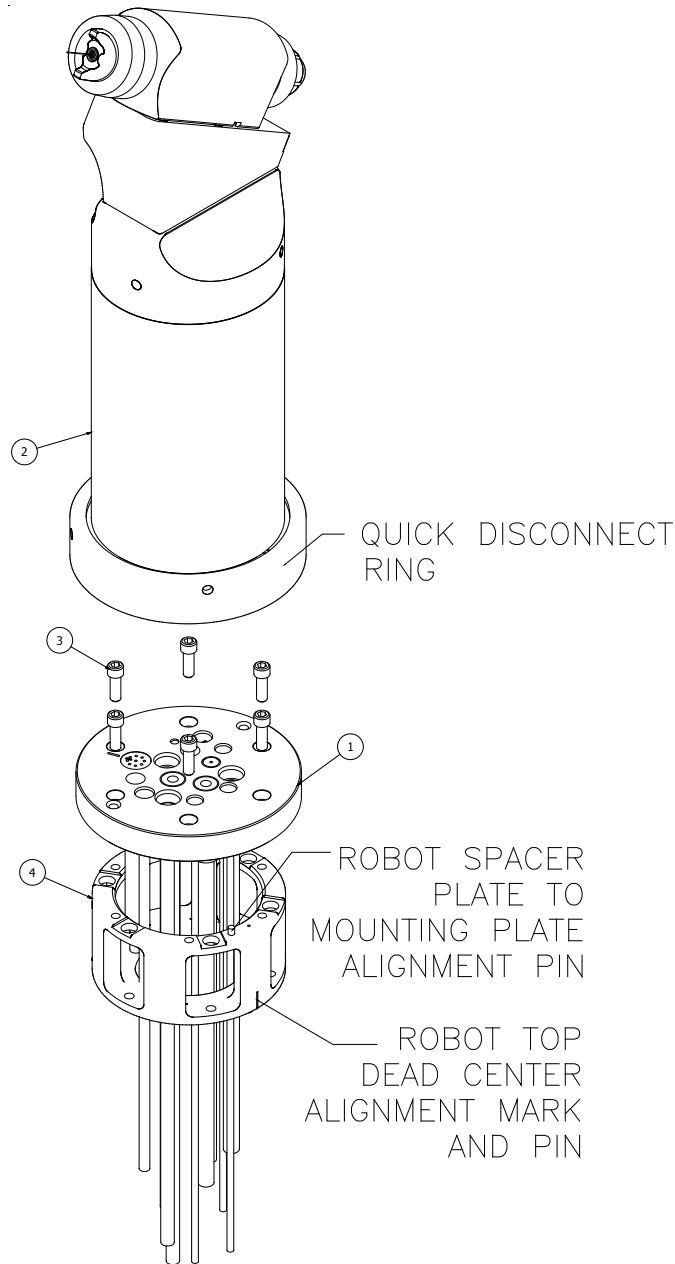


Figure 6: Applicator and Manifold Assembly

APPLICATOR AND MANIFOLD ASSEMBLY - PARTS LIST (Figure 6)			
Item #	Part #	Description	Qty
1	A11061-XXXXXXX	Tubing Bundle Assembly (Metric)	1
	A12000-XXXXXXX	Tubing Bundle Assembly (English)	
2	A11976-XXX	Evolver 303 Spray Applicator Assembly	1
3	76566-24C	Screw, 1/4-20 X 3/4" Lg., SHCS	6
4	See Table 1	Robot Adapter	1

SPRAY / BELL APPLICATOR TRIGGERING

If you are currently using an RMA-303 bell applicator system and want to add the Evolver 303 spray applicator system to spray using the same tubing bundle, a simple conversion must be made in order to allow for switching between spray and bell applicators. Figure 7 shows the recommended system that should be placed in the bearing air line between the main air input and the robot manifold plate. It is suggested that this circuit be placed on the robot arm. This system should also be used when the user is implementing the Evolver 303 spray applicator system and plans to use RMA-303 bell applicators as well.

In Figure 7, the trigger solenoid must be an electronically activated, normally closed valve with exhaust, or a 3-way valve, with 100 psi max., 24VDC. Typically this solenoid already exists in the robot arm and can be used in this circuit. The spray applicator trigger/bearing air select valve must be a pneumatically activated, normally open solenoid. A suggested solenoid is P/N 11678-01. An additional solenoid must be used to activate the PT (Paint Trigger) valve. If any of these solenoids are located inside a hazardous area, they must be explosion proof.

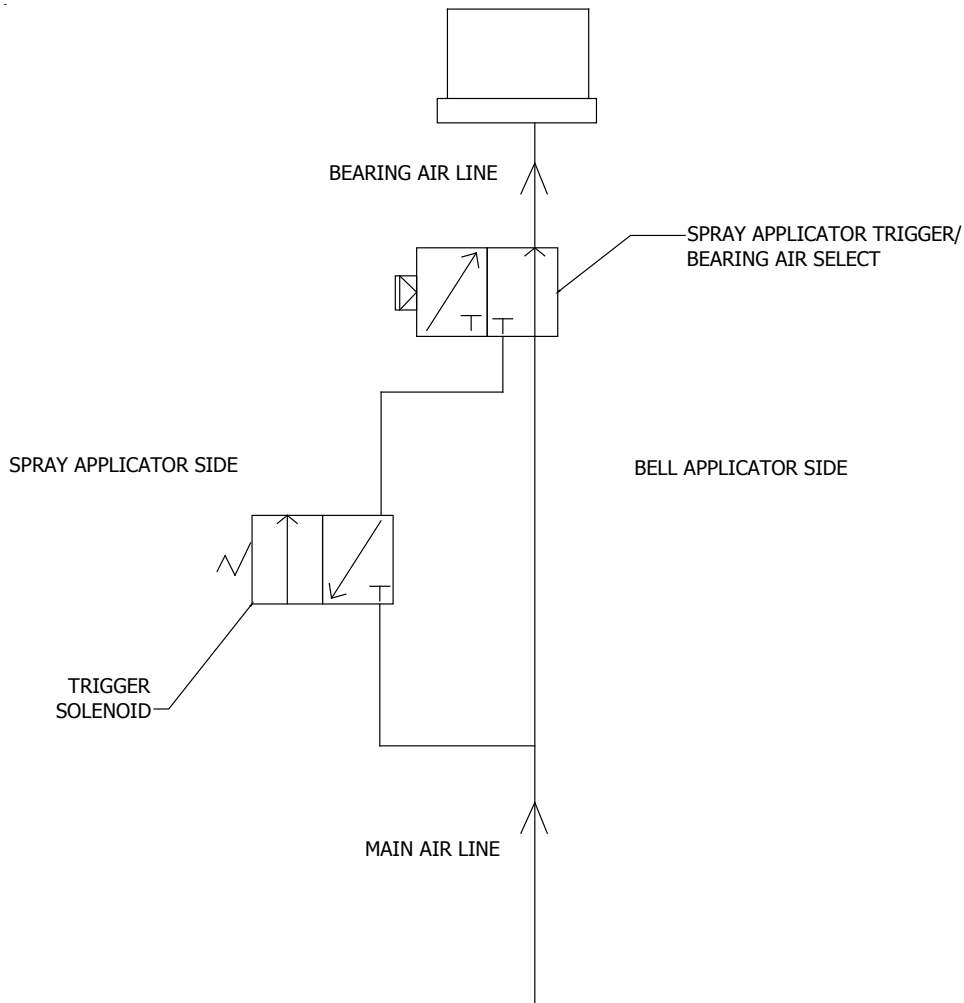


Figure 7: Conversion Schematic

TUBING BUNDLE INSTALLATION

Typically, the tubing bundle is pulled through the robot arm from the robot wrist side. Keep the bundle taped except for the portion of the bundle that will be inside the arm. Pull the tubing through the wrist and arm, leaving about 250mm (10") of tubing sticking out of the front of the wrist plate (see Figure 8).

Fasten the cable bundle in the robot at the rear exit of the arm. Push the robot spacer plate and applicator mounting plate to the robot wrist plate aligning the top dead center marks of the spacer plate and robot wrist plate. Fasten using appropriate screws. Installing the tubing bundle in this fashion will increase tubing bundle life significantly.

BUNDLE LUBRICATION

When the tubing bundle is installed, it should be lubricated with a generous amount of lubricant to increase the service life of the tubes. A recommended lubricant is Shell Alvania EP #02. There are other lubricants that are available for use. Prior to using a lubricant, ensure it is silicone free, resists heat breakdown, and is compatible with the materials being applied.

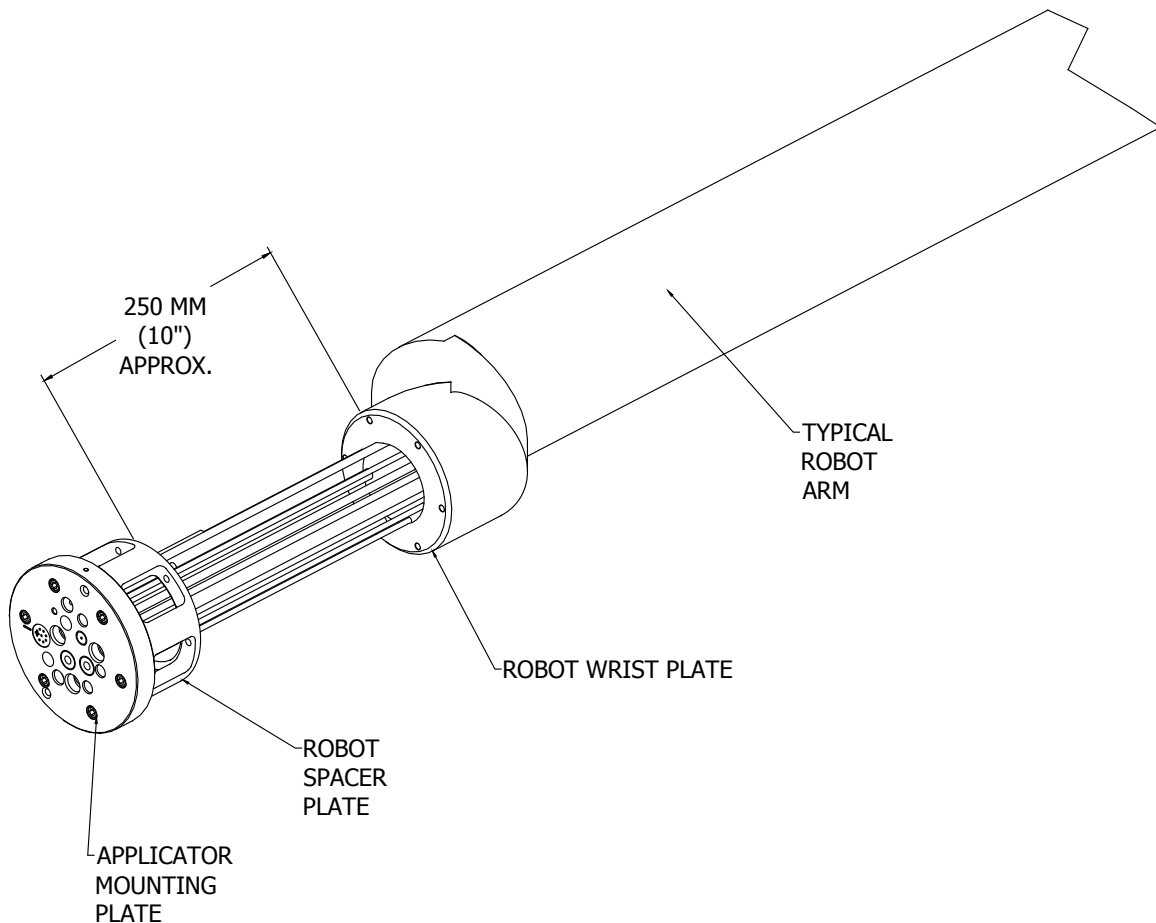


Figure 8: Tubing Bundle Installation

If you currently have an A12000 or A11061 Tubing Bundle for either a RMA-303 or an Evolver 303 and the number engraved on your tubing bundle plate is A11062-REV.A through A11062-REV.G, this plate will not allow you to switch between RMA-303 applicators and Evolver 303 applicators. If you have Rev. H or greater, the online switching capability is provided in the plate.

If you desire to switch between RMA-303 and Evolver 303 applicators, you must contact your local authorized Ransburg distributor for the plate to be reworked. Once the rework is complete, the plate can be re-installed just as before, and both applicator types used interchangeably.

NOTES

OPERATION

⚠ WARNING

► Operators must be fully trained in safe operation of electrostatic equipment. Operators must read all instructions and safety precautions prior to using this equipment (see NFPA-33).

As with any spray finishing system, operation of the Evolver 303 involves properly setting the operating parameters to obtain the best finish quality for the coating material being sprayed, while maintaining correct operation and reliability of the equipment used. Adjustments to operating parameters, which cover spraying, cleaning, and on/off control, include the following:

- Coating Materials
- Fluid Flow Rate Control
- Fluid Valve / Trigger Control
- Atomization Air (Paint Atomization Control)
- Fan Air (Pattern Control)
- Electrostatic Voltage
- Target Distance

⚠ WARNING

► Electrical discharge of a high electrical capacitance fluid/paint system can cause fire or explosion with some materials. If arcing occurs when a specific coating material is used, turn the system off and verify that the fluid is non-flammable. In these conditions, the system is capable of releasing sufficient electrical and thermal energy to cause ignition of specific hazardous materials in the air.

SPRAY APPLICATOR CONTROLS

Atomization Air (SAI/AA) / Fan Air (SAO/F.A)

The atomization and fan air are turned on by the trigger line and are controlled by an internal air valve located in the applicator head. During normal operation with applicator triggered off, there is a slight bleed of air through the atomization port.

Atomizing Air

Adjustments are made through the robot PLC or a manually adjustable air regulator. The lowest air pressure required to break up the paint should be used. Lower atomizing air pressures result in less overspray and increased transfer efficiency.

Fan Air

Adjusting the fan air increases or decreases the size of the spray pattern. Increasing pressure increases pattern size. Pattern adjustment should be made to suit the size and shape of the object being painted. This adjustment is made through the robot PLC or a manually adjustable air regulator.

Air cap atomization and fan pressures should be set and recorded using an air cap test kit. This provides a consistent measurement, so initial settings may be duplicated at any time. (See "Accessories" in the "Parts Identification" section.)

HVLP SPRAY

The Evolver 303 HVLP models, when properly set-up, are designed to provide maximum transfer efficiency by limiting air cap pressures to 10 psi (0.7 bar) (in the U.S., this complies with rules issued by SCAQMD and other air quality authorities). Air cap pressures should be measured with an optional air cap test kit. (See "Accessories" in the "Parts Identification" section.)

NOTE

- ▶ For HVLP operation (max. 10 psi, 0.7 bar cap pressure), **DO NOT** exceed the air inlet pressure, which was read at the gun base before the tubing manifolds, given as follows:

<u>PSI</u>	<u>(Bar)</u>	<u>CAP #</u>
42	(2.9)	48-1
42	(2.9)	481-1

FLUID VALVE CONTROLS

Trigger and Dump (See Figure 9)

The fluid valves in the Evolver 303 are actuated by an air signal. The air pressure must exceed 70 psi (4.8 bar) to assure proper actuation of the valve. Applying air to the valve actuator turns on the fluid flow for the valve.

The paint trigger valve controls the paint flow to the applicator. When actuated, paint flows through the valve to the coiled fluid tube and into the spray head.

The dump valve controls the paint flow through the dump line. When actuated, paint flow is directed to the dump return line. This provides a method of rapidly removing paint from the incoming line for cleaning and/or color change. Normally, the dump valve is not actuated at the same time as the paint valve since the paint valve is intended to cause the fluid to flow to the applicator head at the prescribed input pressure.

SINGLE PURGE SPRAYING

When the target part is finished and a color change is desired, ensure voltage is turned off.



WARNING

- ▶ Failure to turn voltage OFF during color change sequence when solvent is flowing through the fluid nozzle, could cause a fire or explosion.

When the cleaning cycle with solvent is complete, an air purge for several seconds is recommended to clean and dry the ID of the dump line hose.

Paint Viscosity

The applicator is capable of atomizing paint of most any desired viscosity. It is recommended to keep the material viscosity as low as possible. This allows spraying at lower fan and atomization air pressures which result in less overspray and higher transfer efficiency.



WARNING

- ▶ Most paints and solvents, including those listed in "Polar & Non-Polar Solvents Chart" in the "Maintenance" section, are toxic to a certain degree and flammable or combustible. Use them only in a well ventilated atmosphere. Use protective equipment as required in the Material Safety Data Sheet supplied with the substance.

Fluid Flow Rate

Fluid flow is adjusted through the robot PLC by varying the pilot pressure to an exterior fluid regulator. Fluid pressures from the circulating system may exceed the maximum fluid pressure rating of the Evolver 303 applicator. Because of these high fluid pressures, a manual step-down fluid regulator must be used.

Applicator Trigger Control Air

The Evolver applicators require a minimum of 70 psig trigger control air pressure to ensure proper operation of the applicator piston.

Electrostatic Voltage

Under no load conditions, the maximum voltage limit for these spray applicatorss is 100 kV. Some painting operations may require different voltage settings to obtain optimum transfer efficiencies. If Faraday cage areas are predominant on the item being painted, a lower voltage setting would aid in coating these areas.

NOTE

- If a 0 kV command is sent to the MicroPak, a feedback fault will occur.

When not spraying, it is recommended to set back voltage to 30-40 kV or off between target parts. Sometimes, depending upon target carrier spacing, higher setback voltages may be required. The ramp-up time for the HP-404 cascade (0-100 kV) is approximately 3 seconds.

The MicroPak voltage ramp-down works at a rate of 33 kV/sec.

Target Distance

The distance between the applicator tip and the article being painted should be 10-14 inches (.25m-.36m) for a single head applicator and at or near the convergence point for a dual head applicator. Excessive distance causes a waste of coating material and wrap back (paint particles being deposited on the applicator body or the robot arm). At close distances the voltage at the tip of the applicator will be reduced, which decreases the charging effect of the applicator.

WARNING

- If target distance is less than 8-inches (.20m), an arc could occur.

WARNING

- If a bell applicator is being used, and needs to be switched to a spray applicator, the bell applicator must have all voltage, fluids, and air turned off, and the bell cup completely spun-down before the change-out can occur.

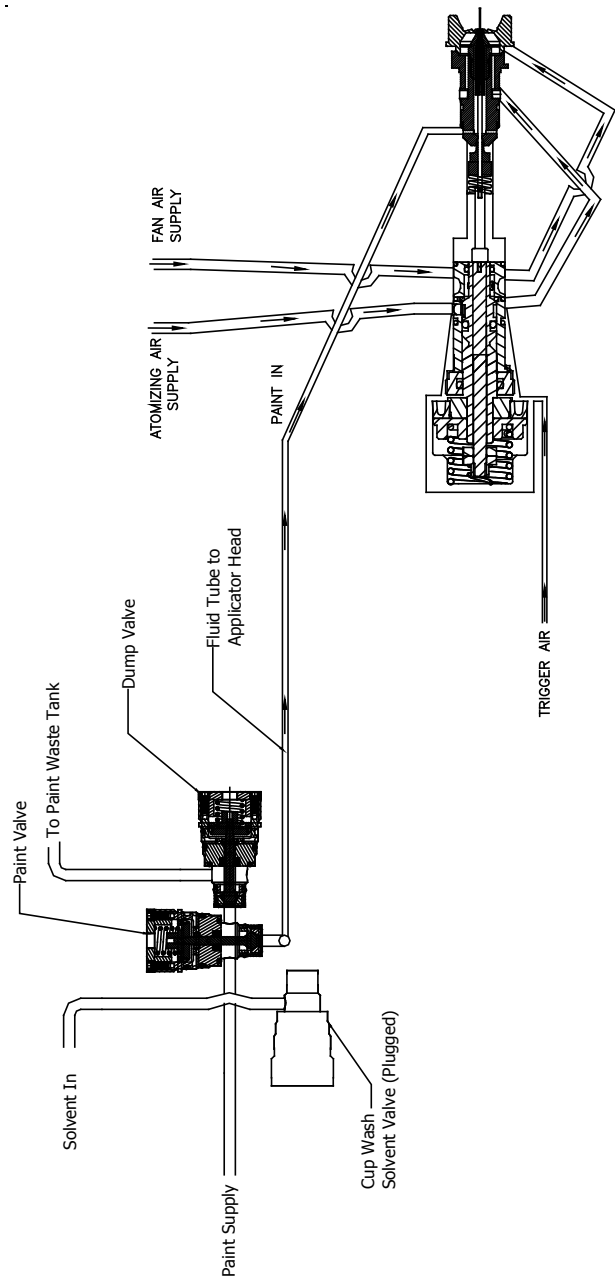


Figure 9: Single Purge Air and Fluid Passage Schematic

MAINTENANCE

Good maintenance is essential to safe and productive operation. Schedules should be established by the user, based on the following general information and observations of the initial production requirements. The Ransburg maintenance and safety information should be made available to each operator.

Normal fire protection measures are necessary, including proper storage of paints and solvents and the proper disposal of waste. Ready access to appropriate fire extinguishing equipment is required. For details, consult the appropriate NFPA safety information and/or applicable country safety standard.

WARNING

- ▶ An electrical discharge or spark may create an electrical and/or fire hazard during maintenance. Do not clean or service the spray applicator with the power supply on. Verify that the power supply has been locked out and tagged out per OSHA and/or your applicable country safety codes.
- ▶ Unexpected robot movement can be hazardous. Do not adjust or repair the spray applicator when the robot is operating or waiting to start. The robot must be locked out and tagged out per OSHA and/or your applicable country safety codes.
- ▶ Solvents used for equipment flushing must have flash point ratings equal to or greater than the flash point rating of the coating material. Solvents used for general cleaning must have flash point ratings higher than 100°F (37.8°C).
- ▶ Never remove spray applicator head from assembly while under pressure.

ROUTINE MAINTENANCE SCHEDULE

Follow these maintenance steps to extend the life of the spray applicator and ensure efficient operation:

Several Times Daily

1. Turn the MicroPak control unit **OFF!** Follow "Lockout/Tagout Procedures".
2. Inspect the fluid nozzle, air cap, and electrode wire for paint accumulation. Clean as frequently as necessary. See "Procedures" in the "Maintenance" section.

WARNING

- ▶ Take precautions to see that skin is not punctured by sharp electrode.

CAUTION

- ▶ Do not bend the applicator electrode while wiping. Never immerse the applicator in solvents. This will cause damage to the electrical components.

Daily (Or at Shift Start)

1. Turn the MicroPak control unit **OFF** and:
 - Check within 20 ft. (6.1 meters) of the point of operation (of the applicator) and remove or ground **ALL** loose or ungrounded containers.
 - Inspect workholders for accumulated coating materials (remove such accumulations if present). Ensure resistance to ground from work holder is less than 1 megohm.
 - Check that the nozzle assembly is clean and undamaged. Ensure air caps are clean and undamaged.

2. Turn the MicroPak control unit **ON!** Energize high voltage.

Shut-Down (Or at Shift End)


1. Turn the MicroPak control unit OFF.
2. Flush the lines and allow the solvent to remain in the lines. See "Procedures" in the "Maintenance" section.
3. Wipe the applicator (including the air cap) and robot wrist with a cloth and a suitable, clean non-polar solvent.

Weekly


1. Check the entire system for damage, leaks, and paint accumulation.
2. Clean the atomizer assembly.
3. Conduct a current output test. See "Procedures" in the "Maintenance" section.

PROCEDURES
Applicator Cleaning/Service
(See Figure 10a and 10b)


1. Flush the paint supply line and the applicator paint passages using a solvent which is compatible with the material being sprayed. Continue to flush until all traces of paint are gone.
2. Turn off the solvent supply, actuate paint push-out air at color changer, and trigger the applicator and PT. Allow all of the fluid to drain from the spray applicator fluid passages.
3. Clean the exterior surfaces of the spray applicator with a solvent soaked rag. As long as the applicator is intact, a **polar** solvent may be used for all cleaning, however, after cleaning, wipe off all surfaces with a **non-polar** solvent to reduce conductive residue on the applicator's surface. (See "Polar & Non-Polar Solvents Chart" in the "Maintenance" section regarding proper solvent selection.)

 CAUTION
<ul style="list-style-type: none"> ▶ Failure to use a non-polar solvent may cause a decrease in voltage at the tip of the applicator. This will significantly decrease transfer efficiency.

4. Remove end cap [1]. Removing the end cap releases tension on all internal spray head components. Remove needle spring [2] and valve spring [3], which are loose after removing the end cap.

 CAUTION
<ul style="list-style-type: none"> ▶ Never attempt to clean the air cap holes with a wire or other metal object. Doing so may damage the air cap, resulting in distortion of the spray pattern.

5. Remove the air cap retainer [36] and air cap [35]. Soak in a non-polar solvent if necessary. If paint remains in the air cap holes, clean with a toothpick or similar soft wood object. Air caps are best cleaned in an ultrasonic cleaner.
6. Remove the air cap locator [33] and fluid tip [34]. Clean using a non-polar solvent.
7. Tightly grip the plastic needle [6] and unscrew counter-clockwise to remove the front electrode needle assembly. A short piece of H-2339 tubing (1/4" OD x 0.175" ID) pressed over the front needle will assist in unscrewing the assembly. If required, use needle nose pliers with masking tape or duct tape. Carefully clean with a non-polar solvent. Replace any parts that show signs of wear or damage.

 CAUTION
<ul style="list-style-type: none"> ▶ If using needle nose pliers to unscrew the front needle, be very careful. Do not grip on the tapered sealing surface. If the pliers slip, they could damage the tapered sealing surface of the needle.

POLAR AND NON-POLAR SOLVENTS		
Non-Conductive (Non-Polar)	Moderately Conductive	Extremely Conductive (Polar)
Amyl Acetate Methyl Amyl Acetate Toluene Xylene High Flash Naptha Mineral Spirits	Methyl Isobutyl Ketone Ethyl Acetate Methyl Ethyl Ketone Butyl Carbitol	Methanol Carbitol Diacetone Butyl Alcohol Acetone Butyl Cellosolve

8. Remove fluid nozzle [32] by unscrewing counter-clockwise. Inspect o-ring [30] and all passages for build up or damage. Clean or replace as necessary. Lubricate and reinsert o-ring into applicator barrel and reinstall fluid nozzle. Torque fluid nozzle to 25 lbs•in (2.82 Nm).


NOTE

► There should be a small gap between the fluid nozzle and the applicator barrel after tightening.

9. After cleaning, insert the electrode assembly [31] back into the spray head assembly. Apply Adhesive #222, low strength (purple) thread-locker, to the threads of the electrode assembly before reassembly.

NOTE

► The fluid tip [34] should always be installed and tightened before installing the needle and valve springs.

 **CAUTION**

► After tightening the fluid tip, always check to see if the proper gap (1/16") between the needle nuts and air valve stem occur, before installing the needle and valve springs back into the head.

10. Screw fluid tip [34] back into place. Hand tighten first, then with a small wrench, tighten an additional 30 degrees.

11. Replace air cap locator [33], air cap [35], and air cap retainer [36].

12. Apply a thin film of petroleum jelly to valve and needle springs [2] and [3]. Install the springs back into the end cap and the spray head assembly.

13. Screw end cap [1] back on.

Current Output Test

1. Clean and blow out all fluid passages with non-conductive solvent.

2. Remove from robot and perform bench test using a spare tubing bundle.

3. Turn the control unit power **ON**.

4. Activate high voltage and slowly approach the applicator electrode with ground hook or wire.

5. Monitor the current output on MicroPak. Current should rise as ground approaches. At approximately 85 microamperes, the MicroPak will shut off. The **OVERCURRENT** indicator should come on.

The spray head can be removed from assembly as shown in Figure 10a for cleaning and service.

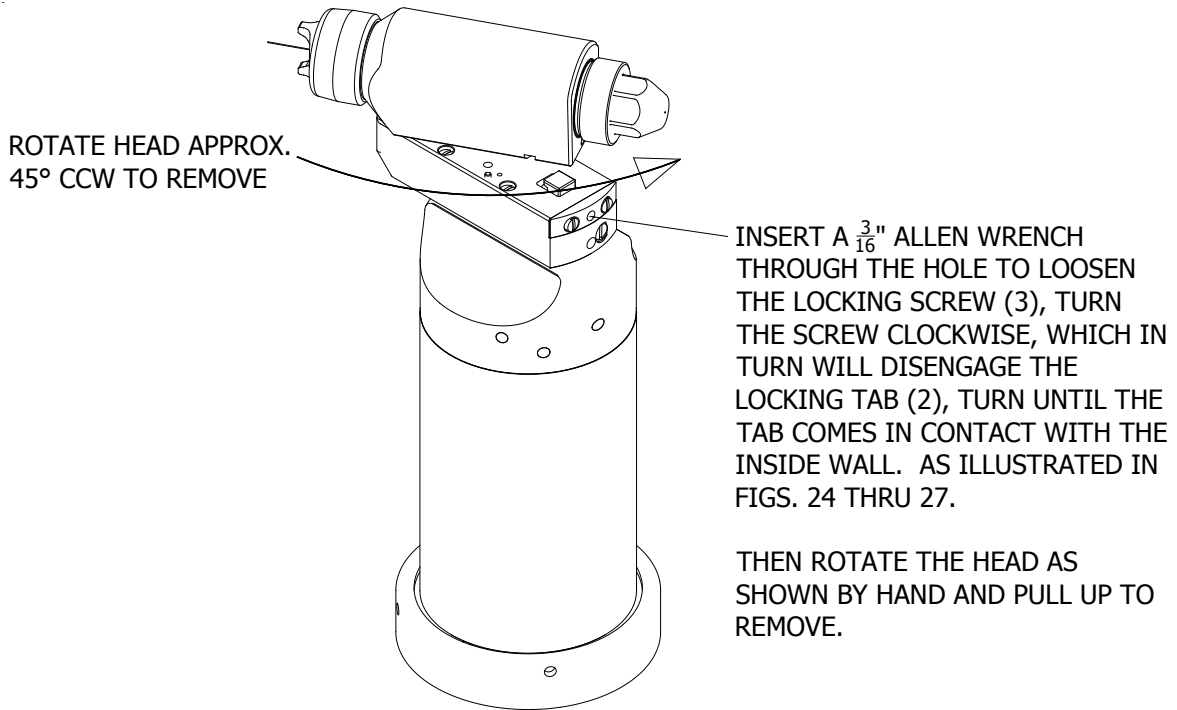


Figure 10a: Spray Head Removal

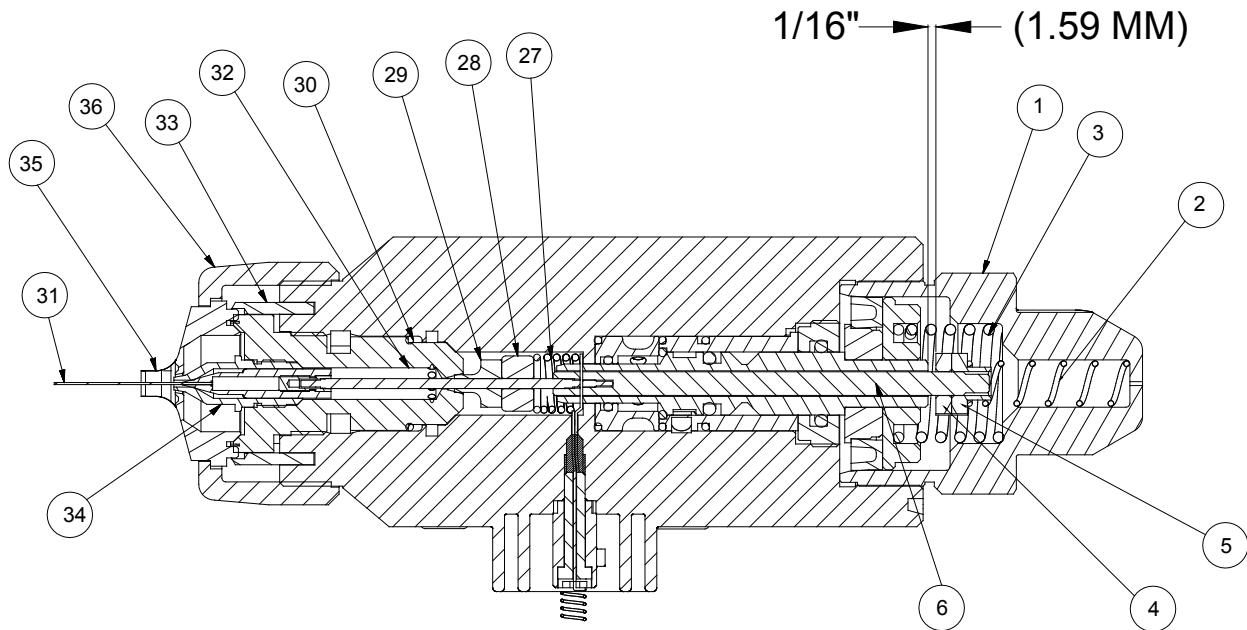


Figure 10b: Spray Head Assembly

SPRAY HEAD ASSEMBLY - PARTS LIST (Figure 10b)			
Item #	Part #	Description	Qty
1	79148-00	End Cap, Spray Head	1
2	17615-00	Spring, Compression	1
3	9334-00	Spring, Valve Return	1
4	7733-07	Jam Nut	1
5	76199-00	Rear Adjusting Nut	1
6	79151-00	Assembly, Needle Shaft	1
27	RME-38	Return Spring, Piston	1
28	EMF-7	Seal, Washer	1
29	RME-32	Seal	1
30	79001-01	O-Ring, Solvent Proof	1
31	70430-01	Electrode, High Wear	1
32	EMF-195	Nozzle, Fluid Hole	1
33	EMF-192	Locator, Air Cap	1
34	79140-02	Fluid Tip, .055" (1.4mm) Diameter	1
35	79153-65R-1	Air Cap, Pined	1
36	79154-00	Retaining Ring, Tapered	1

NOTE

► Ensure that the fan and atomization air are on and flowing prior to triggering the fluid. Ensure air before fluid adjustment is correct. Failure to follow this sequence will cause spits and defects on the part being painted.

SERVICE

Because we want to provide our users with the most up-to-date technology possible, we are constantly seeking to improve products. If a change in product configuration occurs after it is on the market, we will implement that technology in future production and, if practical, make it available to current users. The following service information is based on standard specifications and procedures for this product. If you find some minor deviations between this information and your equipment because of design or manufacturing changes, contact your Ransburg representative to resolve the difference.

⚠ WARNING

- ▶ An electrical discharge or spark may create an electrical and/or fire hazard during maintenance. Do not service the spray applicator with the power supply on. Verify that the power supply on/off switch has been turned off.

- ▶ Unexpected robot movement can be hazardous. Do not adjust or repair the spray applicator when the robot is operating or waiting to start. The robot must be locked out and tagged out per OSHA prior to removing the applicator from the robot manifold assembly.

Before performing any work on the spray applicator, always flush the fluid passages, blow dry with pushout air, and wipe the spray applicator clean. Refer to "Applicator Cleaning" in the "Maintenance" section for instructions on how to properly clean the spray applicator. Depressurize all fluid and air passages before removing the applicator from its manifold. Always work in a clear, clean space to minimize part loss and damage.

⚠ CAUTION

- ▶ As the spray head is removed from the valve manifold assembly, a certain amount of residual fluid may be present. Care must be taken not to allow this fluid to drain into the high voltage terminal rings or air passages.

⚠ WARNING

- ▶ Eye protection should be worn while servicing applicator.

SPRAY HEAD ASSEMBLY

NOTE

- ▶ Disassemble the spray head only enough to remove and replace defective parts. For instance, if only replacing the front electrode it is not necessary to remove the fluid nozzle.

NOTE

- ▶ At assembly, apply a small amount of dielectric grease to grooves in spray head and valve manifold to reduce high voltage breakdown. Excessive grease will not allow spray head [5] to seat fully against mounting block assembly [3] (see Figure 12).


- ▶ To prevent damage, always lubricate the o-rings located on the underside of the spray head.

Rear Needle Replacement

(See Figures 10a, 10b, 11, and 12)

1. Remove the air cap, fluid tip, and the fluid nozzle as described in steps 1 through 8 in "Procedures- Applicator Cleaning / Service" in the "Maintenance" section.

2. Remove the rear needle [6] and lock nuts [4] and [5] as an assembly. Pull the assembly out from the rear of the spray head.

 CAUTION
<p>► Fluid seal [29], seal washer [28], and seal spring [27] will come free at this point. Place hand over front end to prevent dropping parts.</p>

3. Inspect the metal portion of the rear needle [6] for excessive wear. If wear is observed (longitudinal grooves or a noticeable reduction in diameter) replace the needle. Remove the two (2) lock nuts from the rear needle and save. When ever replacing rear needle section, you must also replace the seal [29] at the same time.

4. Place the rear needle assembly back into the spray head.

5. Place seal spring [27] over the rear needle in the front end of the spray head. Hold the spray head upward as the spring will want to fall out.

6. Still holding the spray head upward, place the seal washer [28] and thread the fluid seal [29] onto the rear needle. The tapered end of the fluid seal should be pointed toward the front of the applicator.

7. Insert the lubricated o-ring [30] into the applicator head. Gently push, with a small flat object, down upon its seating edge. Be careful not to push o-rings into fluid groove (see Figure 10b).

8. Reassemble fluid nozzle [32] by pushing the nozzle into the spray head and through the o-ring until the threads engage. Screw the nozzle into the spray head. Torque to 23-25 lbs•in (2.6-2.8 Nm). Plastic threads damage easily; do not overtighten. Note the front flange of the fluid nozzle will not seat flush against the spray head.

9. Apply ADHESIVE #222 Low Strength (purple) Threadlocker into the threads of plastic front needle [31] before assembling onto the rear needle. Be sure that the rear needle assembly is pushed all the way forward before threading on front needle.

10. Reassemble fluid tip [34]. Hand tighten first; then with a small wrench turn an additional 30°.

11. Reinstall the two (2) lock nuts [4] and [5] in the correct order on the back needle as shown making sure to maintain an 1/16" clearance (see Figure 10b).

NOTE

► Ensure that the fan and atomization air are on and flowing prior to triggering the fluid. Ensure air before fluid adjustment is correct. Failure to follow this sequence will cause spits and defects on the part being painted.

12. Reassemble air cap [35] and air cap retainer [33]. The air cap rotate positioning pins must be engaged with the air cap locator holes before final tightening.

13. Apply a thin film of petroleum jelly to valve spring [3] and needle spring [2], and insert back into the end cap. Screw end cap [1] back on.

14. Lubricate all of the o-rings on the underside of the spray head with petroleum jelly, and apply a thin coat of dielectric grease to the grooves of the spray head and the valve manifold before reassembly.

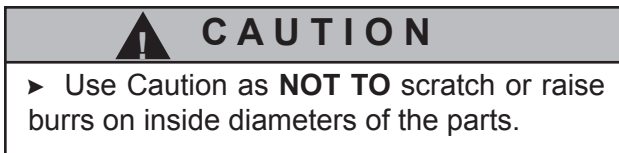
15. Reattach spray head to manifold block by engaging the connection plug [24] (Figure 11) into the mounting block cavity [3] (Figure 12), and turn clockwise until head contacts stop pin on the block, as shown in Figure 10a.

16. Secure with locking tab by turning screw counter-clockwise (see Figure 10a).

Air Valve Removal

(See Figure 11)

1. After removal of end cap and spring, the air valve [10] can be pulled straight out the back of the head assembly.
2. Inspect and replace the u-cup [8], if necessary, by holding the air valve shaft [10] on it's flats and loosening the piston nut [7] counter-clockwise.
3. Remove the seal carrier [17] with seal removal tool [B].
4. Use a bent hook to reach inside the air valve bushing [14], grip slot and pull out. Use the same procedure to pull out the rear seal carrier [17].



5. Remove and replace all o-rings if necessary.
6. O-rings [12] and [18] must be installed inside their mating parts (see Figure 11).
7. The o-ring [16] should be inserted into the front of the bushing [14] and one of the o-rings [15] installed onto the outside groove before the bushing is installed.
8. Reassemble the remaining parts as shown in Figure 11 making sure that the alignment tab on the bushing [14] lines up with the align groove in the body [19].

Add adhesive (7969-03, blue) to secure piston nut (7) to piston shaft (10). Torque piston nut (7) to 35 lbs-in.

9. Torque the seal carriage [13] to 30-35 lbs•in (4.0-4.5 Nm).
10. If the u-cup needs to be replaced, assemble

on piston plate [9] and push both onto shaft, tighten securely with piston nut [7] and install in body as one assembly.

11. Assemble the remainder of the applicator head as stated earlier.
12. If the locking tab plug connection [24] needs to be replaced, first remove the electrode spring connector [23] by pulling straight out with a needle nose pliers. If removed, the spring wire should be replaced.
13. Remove socket head screw [22] and connection plug [24] from body.
14. Replace conductive compressable contact [25] if necessary.
15. Reinstall the connection plug [24] into the body, making sure the tabs on the bottom align with the notches in the body [19].
16. Insert and tighten the screw [22], making sure the tabs remain inside the notches [24] in the body.
17. Insert the spring electrode wire [23] through the hole in the screw using a needle nose pliers on the straight wire portion. Carefully rotate and push the wire through the screw hole and into the compressable contact until the spring contacts the screw head.

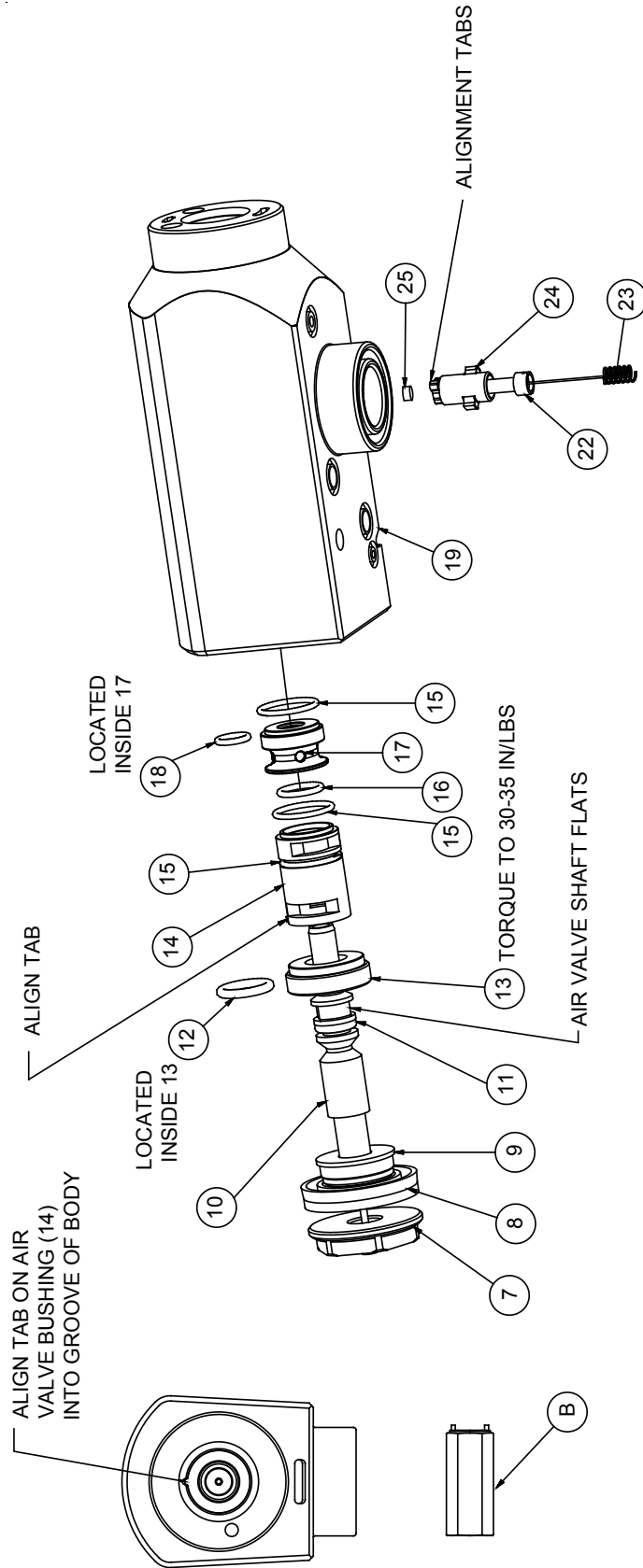


Figure 11: 79138 Evolver Applicator Head Assembly

79138 EVOLVER APPLICATOR HEAD ASSEMBLY - PARTS LIST (Figure 11)

Item #	Part #	Description	Qty
7	79147-00	Nut, Piston	1
8	7723-06	Piston, U-Cup	1
9	79145-00	Plate, Piston	1
10	79144-00	Shaft, Air Valve	1
11	79001-28	O-Ring, Solvent Proof	1
12	79001-29	O-Ring, Solvent Proof	1
13	79146-00	Seal Carrier, Rear Piston	1
14	79143-00	Bushing, Air Valve	1
15	79001-01	O-Ring, Solvent Proof	3
16	13076-13	O-Ring, PTFE	1
17	79172-00	Carrier, Rear Seal	1
18	79001-06	O-Ring, Solvent Proof	1
19	79137-00	Head, Machining	1
22	79142-00	Screw, #8-32 X .75" Long, SHCS	1
23	79171-00	Spring, Connector	1
24	79141-00	Plug, Connection	1
25	14061-09	Conductive Compressable Contact	1
B	A10400-00	Seal Carrier Tool	1

REMOVING SPRAY APPLICATOR FROM THE REAR MANIFOLD ASSEMBLY

(See Figure 12)

Anytime service is required within the applicator shroud, the applicator should be removed from the robot mounting plate assembly. After the applicator is removed from the robot, always move to a clear, clean work area to remove the applicator shroud and begin servicing.

1. Purge all fluid from the system and blow lines dry with pushout air before the applicator is removed.
2. All pressures must be removed, both air and fluid, before removing the applicator. Fluid pressure can be removed by actuating the applicator trigger with the fluid regulator open.
3. Turn off the power supply to the applicator.
4. Remove applicator from robot by turning the retaining ring [6] counter-clockwise from the manifold robot mounting plate [2] (see Figure 12).
5. Remove spray head [5] (Figure 12) as previously described in Figure 10a.

Spray Applicator Disassembly (See Figures 12, 13, 14, and 15)

6. Remove the four (4) screws [7] from mounting block [3] and pull the block out of the upper manifold [4] as shown in Figure 12.
7. Remove and inspect the o-rings [2, 16, and 17] on the upper manifold [18]. Replace if necessary (see Figure 13).
8. Remove mounting ring [6] by pulling straight up as shown in Figure 13.
9. Remove the five (5) screws [8] from the bottom of the mounting plate [12] (see Figure 13).
10. Remove the break-away ring [9] from the mounting plate [12].

11. Pull down on the shroud [10] and slip it off the applicator assembly to reveal the internal assembly components. It may be necessary to carefully use a flat head screwdriver between the shroud [10] and the upper manifold [18] to pry the two apart.

12. Remove the five (5) air bolts [7] from the bottom of the mounting plate [12]. Inspect the five (5) o-rings [3] located within the air bolts [7] and replace if necessary.

13. Remove the coil fluid tube [5] by unscrewing the fluid fitting [4] from the valve manifold block [11].

14. Remove the cascade plug [19] from the mounting plate [12] by unscrewing the set screw located on the side of the mounting plate [12] in-line with the timer markings. (For set screw location see Figure 14).

15. Slide the valve manifold block [11] and mounting plate [12] off of the support rods [1] (see Figure 13).

16. Unscrew the five (5) support rods [1] from the upper manifold [18] using an A11284-00 tool.

17. Remove the cascade [19] from the upper manifold [18] by pulling straight down on the cascade [19] (see Figure 13).

18. Remove the coil fluid tube [5] from the upper manifold [18] by unscrewing the fluid fitting [4].

19. Remove the mounting plate [12] from the valve manifold block [11] by unscrewing the three (3) screws [13] located on the bottom of the mounting plate [12].

20. Reassemble in reverse order making sure to align the cascade wire plug timing mark with the timing mark on the mounting plate [12] as shown in Figure 14. Remember to tighten the set screw called out in Figure 14.

21. When placing the shroud [10] back onto the assembly, make sure to mate the edge with the lip on the shroud [10] with the upper manifold [18], and fit the lip of the shroud [10] into the groove on the upper manifold [18], as shown in Figure 13.

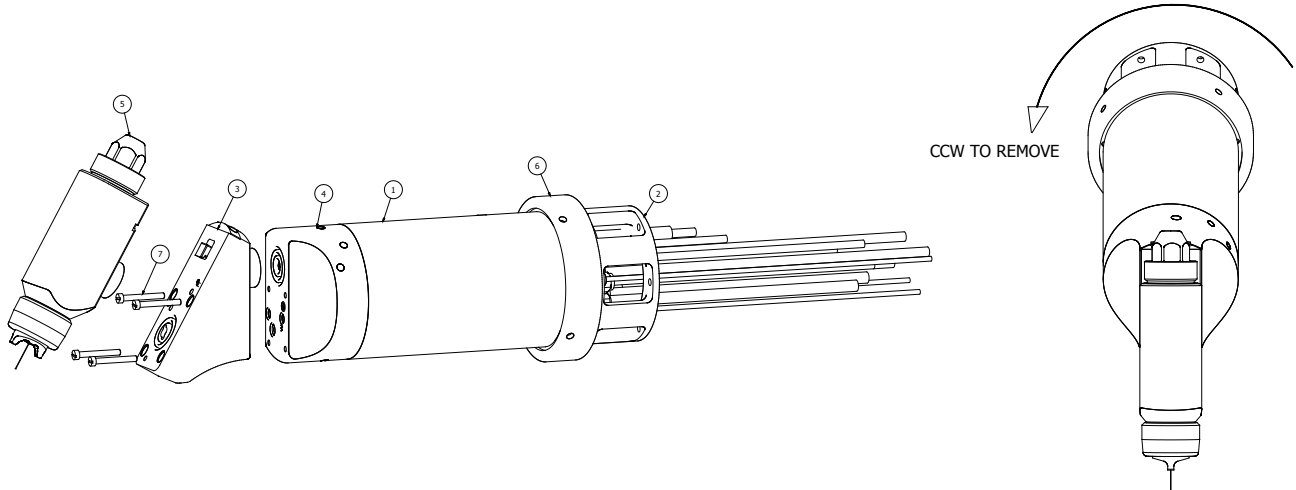


Figure 12: Evolver 303 60° Single Head Applicator Assembly

EVOLVER 303 60° SINGLE HEAD APPLICATOR ASSEMBLY - PARTS LIST (Figure 12)

Item #	Part #	Description	Qty
1	A11255-00	Shroud, RMA-303	1
2	A11061-XXXXXXX	Assembly, Robot Mount Tubing Bundle (Metric)	1
	A12000-XXXXXXX	Assembly, Robot Mount Tubing Bundle (English)	
3	79179-00	Mounting, Block Assembly	1
4	A11983-00	Manifold, Evolver 303 Assembly	1
5	79138-01	Spray Head Assembly, Conventional Spray	1
	79138-02	Spray Head Assembly, HVLP Spray	
6	A11201-00	Ring, Quick Disconnect	2
7	LSFA00027-00	Screw, Retaining, #10-32 X 1.50"	4

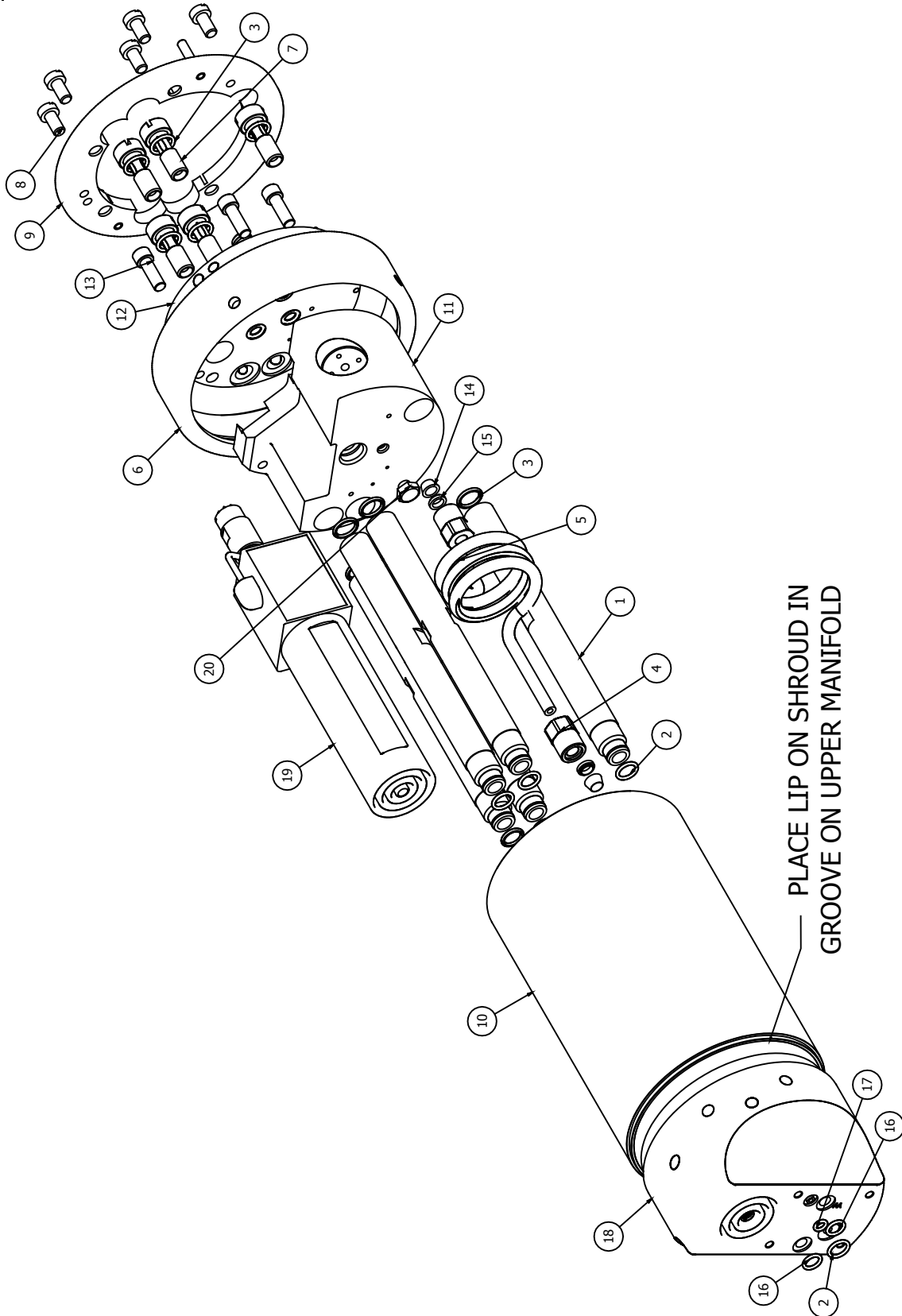


Figure 13: Disassembly Of A11981 Spray Applicator Assembly

A11981 SPRAY APPLICATOR ASSEMBLY - PARTS LIST (Figure 13)

Item #	Part #	Description	Qty
1	A11214-00	Rod, Support	5
2	79001-14	O-Ring, Solvent Proof	6
3	79001-07	O-Ring, Solvent Proof	10
4	78449-00	Fitting, Fluid	2
5	77531-00	Coil Tube (for Highly Resistive Materials)	1
	77517-00	Coil Tube (for Conductive Materials)	
	78450-00	Coil Tube, (for Highly Conductive Materials)	
6	A11201-00	Ring, Quick Disconnect	1
7	77508-00	Bolt, Air	5
8	7683-16C	Screw, Break-Away	5
9	A11203-00	Assembly, Break-Away Ring	1
10	A11255-00	Shroud, RMA-303	1
11	A11241-01	Assembly, Valve Manifold	1
12	A11206-01	Assembly, Rear Manifold Plate, RMA-303 (Single Purge)	1
13	76566-24C	Screw, #1/4-20 X 3/4" Lg. SHCS	3
14	EMF-203-04	Ferrule, Front 1/4" Tube	2
15	EMF-202-04	Ferrule, Back 1/4" Tube	2
16	79001-06	O-Ring, Solvent Proof	2
17	79001-04	O-Ring, Solvent Proof	1
18	A11983-00	Manifold, Evolver 303, Assembly	1
19	79010-01	Cascade Assembly (HP 404 Type), RMA-303	1
20	A11984-00	#1/4-20 X 3/8" Hex Cap, SC, Black	1

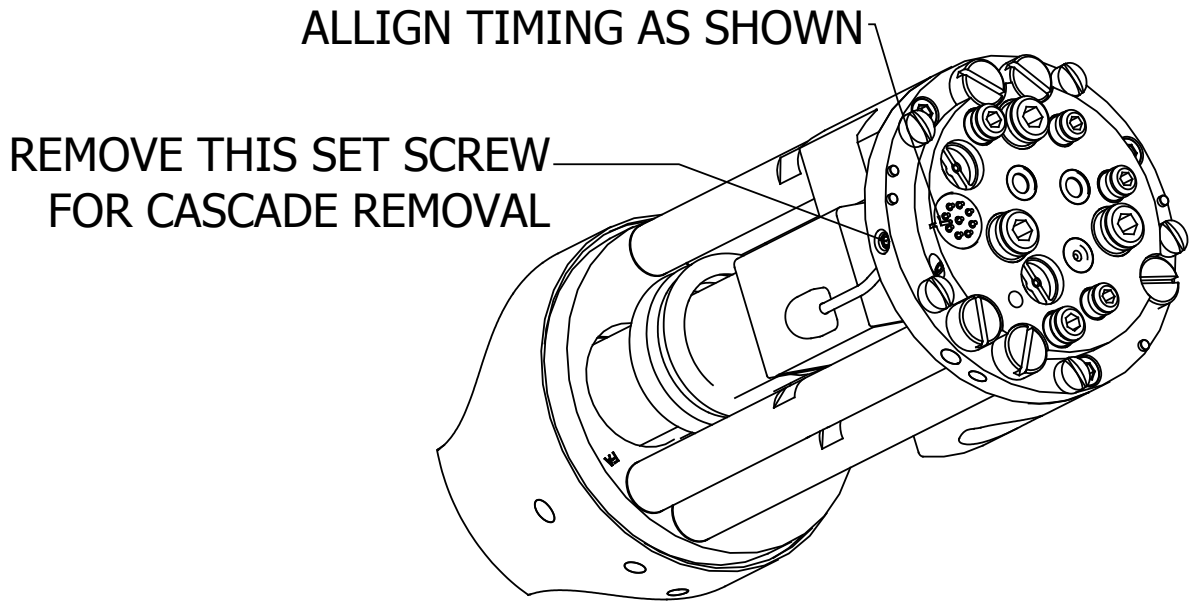


Figure 14: Cascade Wire Plug Assembly

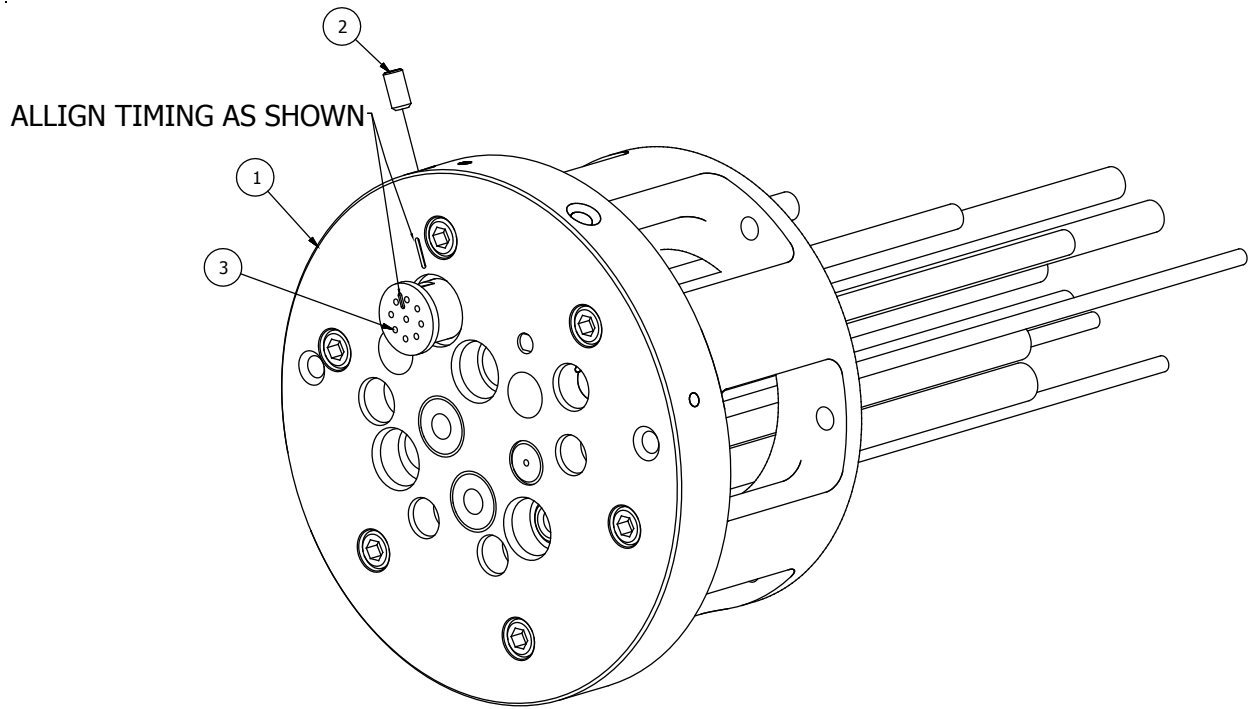


Figure 15: Low Voltage Cable Removal

LOW VOLTAGE CABLE REMOVAL - PARTS LIST (Figure 15)			
Item #	Part #	Description	Qty
1	A11062-00	Assembly, Robot Mounting Plate	1
2	SSF-2052	Set Screw, 3/8" Lg. X #10-24	2
3	79008-XX	Assembly, Cable Low Voltage	1

Low Voltage Cable Removal (Refer to Figure 15)

1. Disconnect low voltage cable [3] from rear of power supply. For A10406-XX power supply, disconnect circular connector from receptacle on rear of power supply. For LECU5004-XX power supply, disconnect wires from connector J3 at rear of MicroPak.
2. Loosen retaining ring [6] (see Figure 13) and remove applicator from robot wrist.
3. Using 3/16" Allen wrench, remove set screw [2] (see Figure 14).
4. Remove the low voltage cable [3] by pulling through the robot arm and mounting plate [1].
5. To reinstall, insert power supply end of cable [3] through mounting plate [1], pull through robot arm and connect to junction box or power supply. For connections to power supply, plug connector into receptacle (A10406-XX power supply) or connect wires as shown in Figure 4 (LECU5004-XX power supply).
6. Align the timing mark of the plug on the applicator end of the cable [3] with the mark on the mounting plate [1] and tighten set screw [2].

Rear Manifold Removal / Replacement

Remove the rear manifold from the applicator (see "Spray Applicator Disassembly" in the "Maintenance" section). Inspect the valve weep ports on the manifold body for leaks or contamination. If any paint is visible in these areas, the valves need to be replaced as shown in Figure 16.

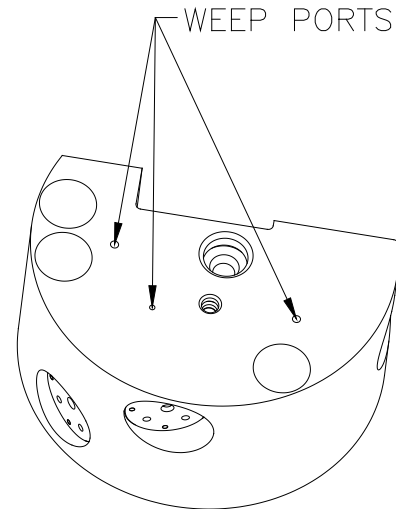


Figure 16: Weep Port Locations

Using the valve removal tool (A10766-00), engage the four (4) pins on the tool to the corresponding four (4) hole pattern in the top of the valve. Using a 1/2" (13mm) socket, end-wrench, or adjustable wrench, remove the valve by turning counter-clockwise, as shown in Figure 17.

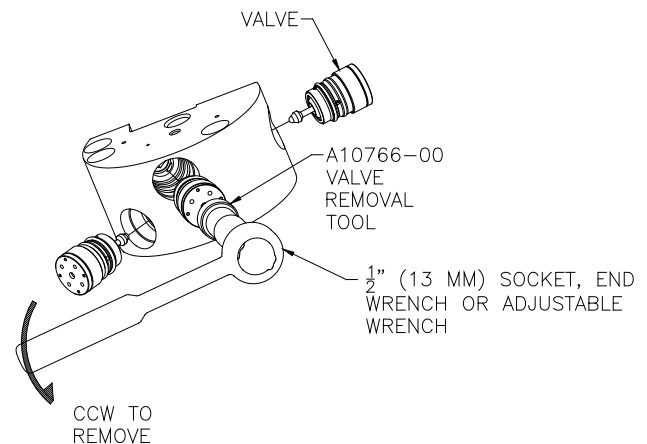


Figure 17: Valve Removal

Using the seat removal tool (A10756-00), insert the smaller hex end into the block to engage the seat female hex. Using a 3/8" (10mm) socket end-wrench, or adjustable wrench, remove the seat by turning counter-clockwise, as shown in Figure 18.

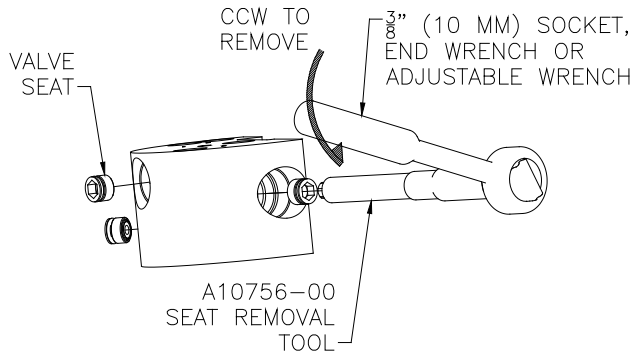


Figure 18: Seat Removal

Valve and Seat Inspection

Inspect the valves and seats for any build-up of materials. Valves should be cleaned with an appropriate cleaning solvent to remove the material on it.

NOTE

- ▶ A seat should not be replaced unless there are indications of valve leakage in operation.

Replacement

Lubricate the seat o-ring using a suitable lubricant. By hand, using the seat tool (A10756-00), carefully start the seat into the pocket for the seat.

NOTE

- ▶ Carefully start the seat into the pocket. It may be easily cross threaded.

Hand tighten the seat in place. Using a torque wrench with a 3/8" (10mm) socket, torque the valve seats to 15-20 lbs•in (1.2.3 Nm)

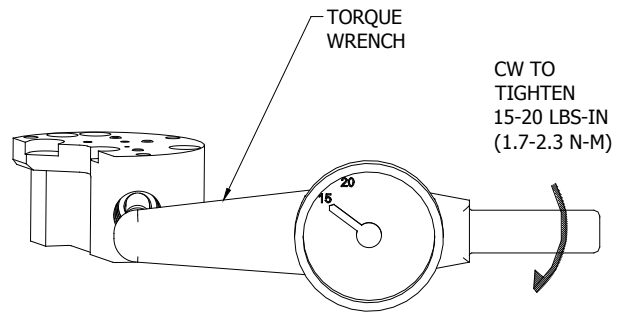


Figure 19: Valve Seat Torque

CAUTION

- ▶ Always use a torque wrench to torque the seats in place. Over-torquing the seats may cause permanent irreparable damage to the rear manifold.

Lubricate the valve o-rings with a suitable o-ring lubricant. By hand, start the threads clockwise of the valve into the pocket. Tighten using a 1/2" (13mm) socket and torque to 15-20 lbs•in (1.7-2.3 Nm).

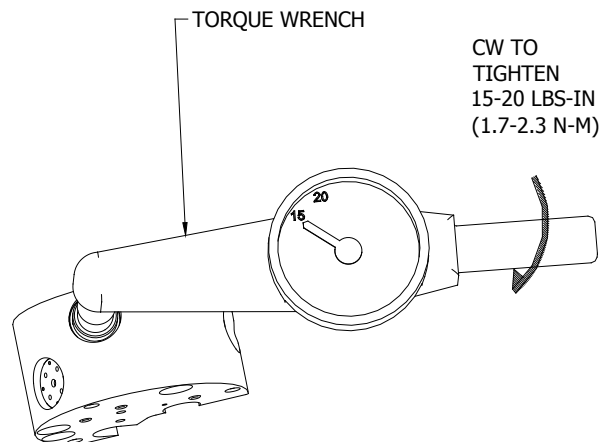


Figure 20: Valve Torque

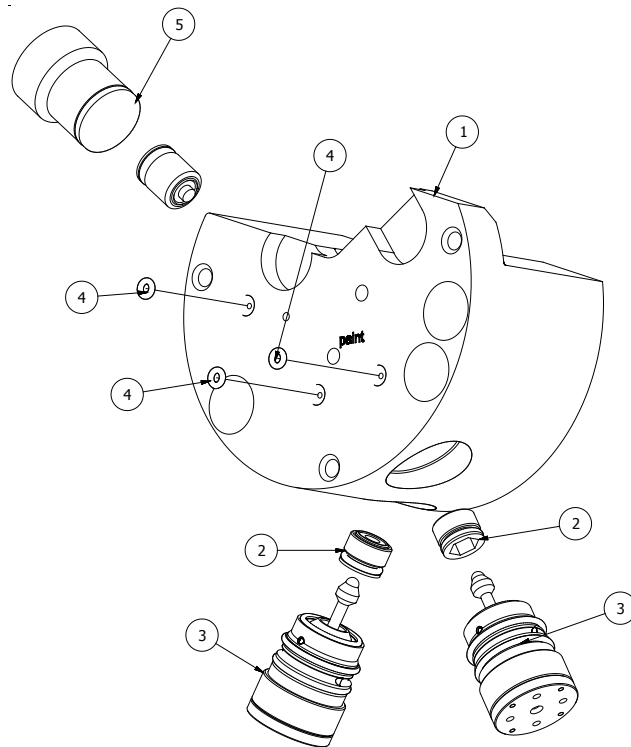


Figure 21: A11241-01 Single Purge Valve Manifold Disassembly

A11241-01 SINGLE PURGE VALVE MANIFOLD DISASSEMBLY - PARTS LIST (Figure 21)

Item #	Part #	Description	Qty
1	A11213-00	Valve, Manifold, RMA-303	1
2	77367-00	Seat, Valve	2 2
3	78949-00	Assembly, Valve	2 1
4	79001-38	O-Ring, Solvent Proof	3
5	77620-00	Kit, Valve Plug	1

PARTS LIST BULLET DEFINITION TABLE - (Figure 21)

- 1 Install assemblies as shown. Apply A11545-00 petroleum jelly to o-rings. Torque to 15-20 lbs•in (1.70-2.3 Nm) after valve is down.
- 2 Install valve seat assemblies as shown. Apply A11545-00 petroleum jelly to o-rings. Torque to 15-20 lbs•in (1.70-2.3 Nm)

TROUBLESHOOTING GUIDE

General Problem	Possible Causes	Corrective Action
<p>Fluid Does Not Turn On</p>	<ol style="list-style-type: none"> 1. Trigger pilot regulator has not been set to a minimum of 70 psig 2. The green air tube possibly left disconnected during re-assembly 3. Green tube leading from the source to the applicator mounting plate is pinched or broken 4. Piston seal within the applicator spray head is not in place or there is an extremely tight fit between the seal and the cylinder wall 5. PT is not actuated 6. Paint trigger (BA/PT) not actuated 	<ol style="list-style-type: none"> 1. Increase to 70 psig minimum. 2. Reconnect tubing. 3. Check the tubing for kinks or damage. Replace if worn or damaged. 4a. Make sure that the seal is in the proper position and/or lubricate with a small amount of petroleum jelly. 4b. O-rings left out of small Ø tie rods. 4c. O-ring missing between mounting block and upper manifold. 4d. O-ring missing between mounting block and replaceable head. 5. Make sure PT is activated. Both PT and BA/PT (paint trigger) must be activated to trigger the applicator on. 6. Make sure paint trigger (BA/PT) is actuated. Both PT and BA/PT must be actuated to trigger the applicator on.
<p>No Fan or Atomization Air Pressure At the Air Cap</p>	<ol style="list-style-type: none"> 1. Low trigger pilot air pressure (70 psi min. required) 2. Air tubes 79134-00 are not installed properly. 3. Blue or gray 3/8" OD tube is cut or pinched 	<ol style="list-style-type: none"> 1. Increase pressure. 2. Reinstall and tighten as required. 3. Examine, repair as required.
<p>Excessive Current or Loss of High Voltage</p>	<ol style="list-style-type: none"> 1. Metallic particle alignment in coiled tube 2. Fluid leaks inside 3. Fluid coil pin-holed 4. Exterior of applicator contaminated 	<ol style="list-style-type: none"> 1. Start fluid flow before turning voltage on. 2. Repair/replace fittings and/or coiled fluid tube as required. 3. Replace coil as required. 4. Clean with non-polar solvent.

Note: A test station to bench test the applicator off-line will speed the Troubleshooting process.

(Continued On Next Page)

TROUBLESHOOTING GUIDE (Cont.)

General Problem	Possible Causes	Corrective Action
No Electrostatics	1. Cascade not functioning	1. Check low voltage cable and harness timing mark positions. Correct as required. 2. Cascade bad. Replace as required. 3. Low voltage cable connections wrong at MicroPak. 4. Low voltage cable bad. Replace as required.
Low kV, High μA Output	1. Exterior of applicator contaminated with conductive material	1. Replace applicator cover. 2. Clean exterior with a non-polar solvent.
Low kV, Low μA Output	1. Cascade failure	1. Replace as required.
No Fluid Flow	1. Fluid valve does not actuate 2. Clogged fluid tube 3. Bad transceiver module 4. Plugged inlet 5. Regulator (needle and seat) stuck 6. No pilot air 7. Two component valve contaminated 8. In-line mix tube clogged	1.a. Verify that air pilot signal is present. b. Fluid valve air pilot pressure is too low. Increase air pressure to 70 psig minimum. c. Replace fluid valve. 2. Remove and inspect fluid tube. 3. Replace transceiver module. 4. Flush clean 5. Remove and clean or replace 6. Check air pilot 7. Remove valve manifold and clean 8. Replace
Continuous Fluid Flow	1. Fluid valve open 2. Fluid valve seat damaged or worn 3. Regulator (needle and seat) dirty 4. Regulator pilot air not shut off	1 a. Remove air pilot signal. b. If still open, replace fluid valve. 2. Replace fluid valve seat. 3. Remove and clean or replace. 4. Check air supply.

(Continued On Next Page)

TROUBLESHOOTING GUIDE (Cont.)

General Problem	Possible Causes	Corrective Action
Uncontrollable Fluid Flow	<ol style="list-style-type: none"> 1. Insufficient back pressure to fluid regulator 2. Fluid regulator does not control flow (system) 3. Diaphragm stretched from excessive air pressure 4. Ruptured diaphragm 5. Inconsistent air pilot supply 	<ol style="list-style-type: none"> 1. Replace fluid tube with the next smaller inner diameter size. 2. Disassemble fluid regulator and inspect for failed components (system). 3. Rebuild regulator. 4. Rebuild regulator. 5. Check air source.
Paint Sputtering	<ol style="list-style-type: none"> 1. Ruptured Diaphragm 	<ol style="list-style-type: none"> 1. Replace regulator diaphragm.
Fluid Leakage Around Fluid Valve	<ol style="list-style-type: none"> 1. Damaged o-ring(s) on outer diameter of valve body 2. Damaged or worn needle seals inside valve assembly 	<ol style="list-style-type: none"> 1. Replace o-ring. 2. Inspect tubing coil for scratches and replace if damaged.
Paint Leakage (Regulator)	<ol style="list-style-type: none"> 1. Diaphragm (screws) loose 2. Ruptured diaphragm 	<ol style="list-style-type: none"> 1. Replace o-ring(s). 2. Replace valve assembly.
Low or No High Voltage	<ol style="list-style-type: none"> 1. High current draw 2. Loss of low voltage cable connection between robot and mounting plates. 3. Improper limiting current and voltage settings. 4. Applicator grounding out (usually indicated by high current draw or by MicroPak over-current fault light) 	<ol style="list-style-type: none"> 1. a. Paint resistivity to be .1MW to ¥. b. Replace coiled fluid line. 2. Remove applicator and inspect low voltage connections on both plates. Verify alignment marks between connectors and plates and verify that connector face is flush with plate. Verify that set screws are secur, but not too tight, as this will prevent the spring loaded pins on the robot plate from extending and making contact. 3. To readjust settings, refer to "MicroPak" operating manual. 4 a. Clean atomizer externally with non-polar solvent. b. Check the atomizer for internal fluid leaks. c. Check for fluid leaks at quick disconnect mounting (between bell plate and robot plate). d. Check for internal arcing (usually indicated by internal sparking sounds). e. Make sure cascade low voltage connection is properly shielded.

(Continued On Next Page)

TROUBLESHOOTING GUIDE (Cont.)

General Problem	Possible Causes	Corrective Action
<p>Low or No High Voltage (Cont.)</p>	<p>5. Faulty low voltage connections (usually indicated by MicroPak feedback fault light)</p> <p>6. Faulty high voltage connection</p> <p>7. MicroPak or cascade failure</p> <p>8. Improper color change (i.e. paint or solvent in dump line)</p>	<p>5. a. Make sure quick disconnection electrical connection is aligned and clean. b. Check low voltage connection at cascade.</p> <p>6. Remove cascade and check continuity between cascade connection and turbine shaft.</p> <p>7. Refer to "MicroPak" service manual for detailed "Troubleshooting Guide".</p> <p>8. Optimize color change.</p>
<p>Low Transfer Efficiency (or light coverage)</p>	<p>1. Low or no high voltage</p> <p>2. Poor grounding of parts being coated</p> <p>3. Excessive target distance</p>	<p>1. Verify high voltage at bell cup edge. Normally, a high voltage setting of 70 -100 kV is appropriate for most applications.</p> <p>2. Verify that parts being coated are properly grounded (the electrical resistance between the part and ground must not exceed 1 megohm).</p> <p>3. The recommended target distance is between 10-14-inches (.25m-.36m) (see "Target Distance" in the "Operation" section of this manual).</p>
<p>Fluid and/or Air Leakage Between the Robot and Rear Manifold Plates</p>	<p>1. Applicator mounting nut is loose</p> <p>2. O-ring is missing</p> <p>3. O-ring is damaged</p>	<p>1. Tighten mounting ring.</p> <p>2. Install o-ring.</p> <p>3. Visually inspect for damage and replace.</p>

Note: To check for fluid leaks, it is easiest to first remove the applicator from the test station and remove the shroud from the applicator. Then the applicator can be remounted to the test station. Leak detector may be used at all appropriate sources. Be certain to wipe off all residual solution using a non-conductive solvent such as Naphtha.

PARTS IDENTIFICATION

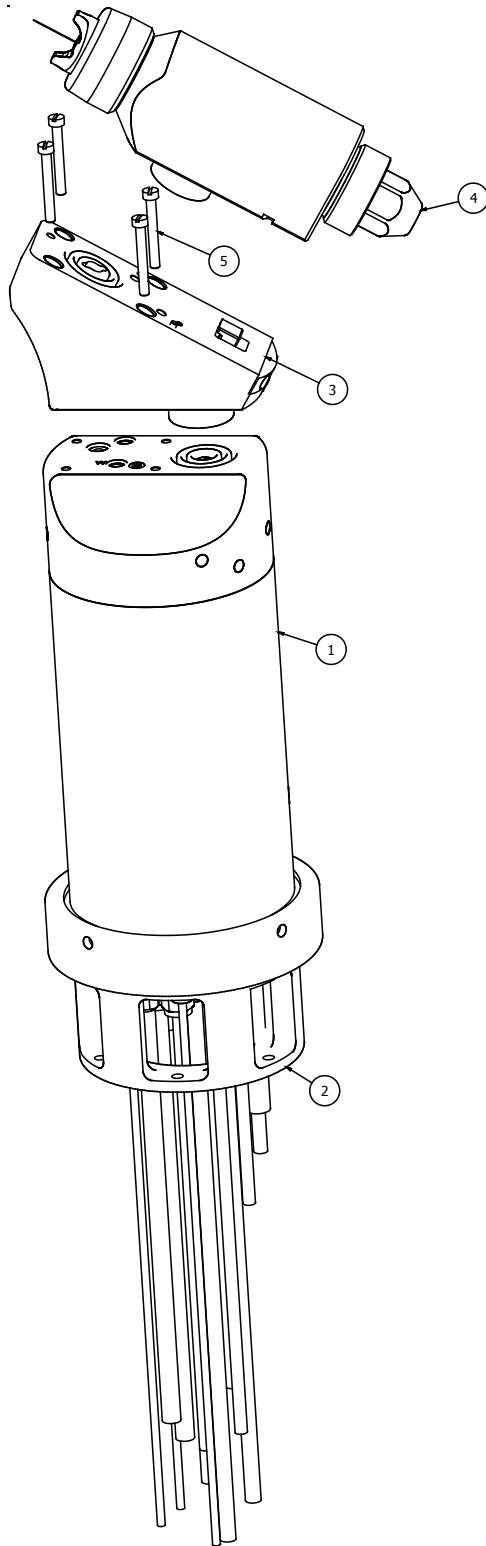


Figure 22: A11976 Spray Applicator Assembly

A11976 SPRAY APPLICATOR ASSEMBLY - PARTS LIST (Figure 22)			
Item #	Part #	Description	Qty
1	Table B - "B"	Manifold Assembly, Evolver 303	1
2	Table D - "F"	Robot Adapters	1
3	Table A - "C"	Mounting Block Assembly	1
4	Table C - "E"	Spray Head Assembly	Table A - "D"
5	Table A - "A"	Screw, Retaining, #10-32 X 1.50"	4

TABLE A HEAD CONFIGURATION				
Dash No.	Description	"A"	"C"	"D"
0	60° Single Head	LSFA0027-00	79179-00	1
1	90° Single Head	LSFA0027-00	79180-00	1
2	60° Dual Head	79206-00	79234-00	2
3	90° Dual Head	79206-00	79224-00	2

TABLE B MANIFOLD CONFIGURATION		
Dash No.	Description	"B"
0	For Highly Resistive Materials	A11981-01
1	For Conductive Materials	A11981-02
2	For Highly Conductive Materials	A11981-03

TABLE C ATOMIZATION TECHNOLOGY		
Dash No.	Description	"E"
0	Conventional Spray	79138-01
1	HVLP Spray	79138-02

TABLE D ROBOT ADAPTERS		
Dash No.	Description	"F"
0	No Adapter	----
1	"ABB" Robot Adapter	79107-00
2	"Fanuc" P-155 Robot Adapter	78983-00
3	"Fanuc" P-200 Robot Adapter	79131-00
4	Adapter (Kawasaki-KE610L)	A10847-00
5	Adapter (Motoman-PX2850)	A10848-00
6	Adapter (Motoman-PX2900)	A10849-00
7	Adapter (B & M LZ2000)	A10851-00

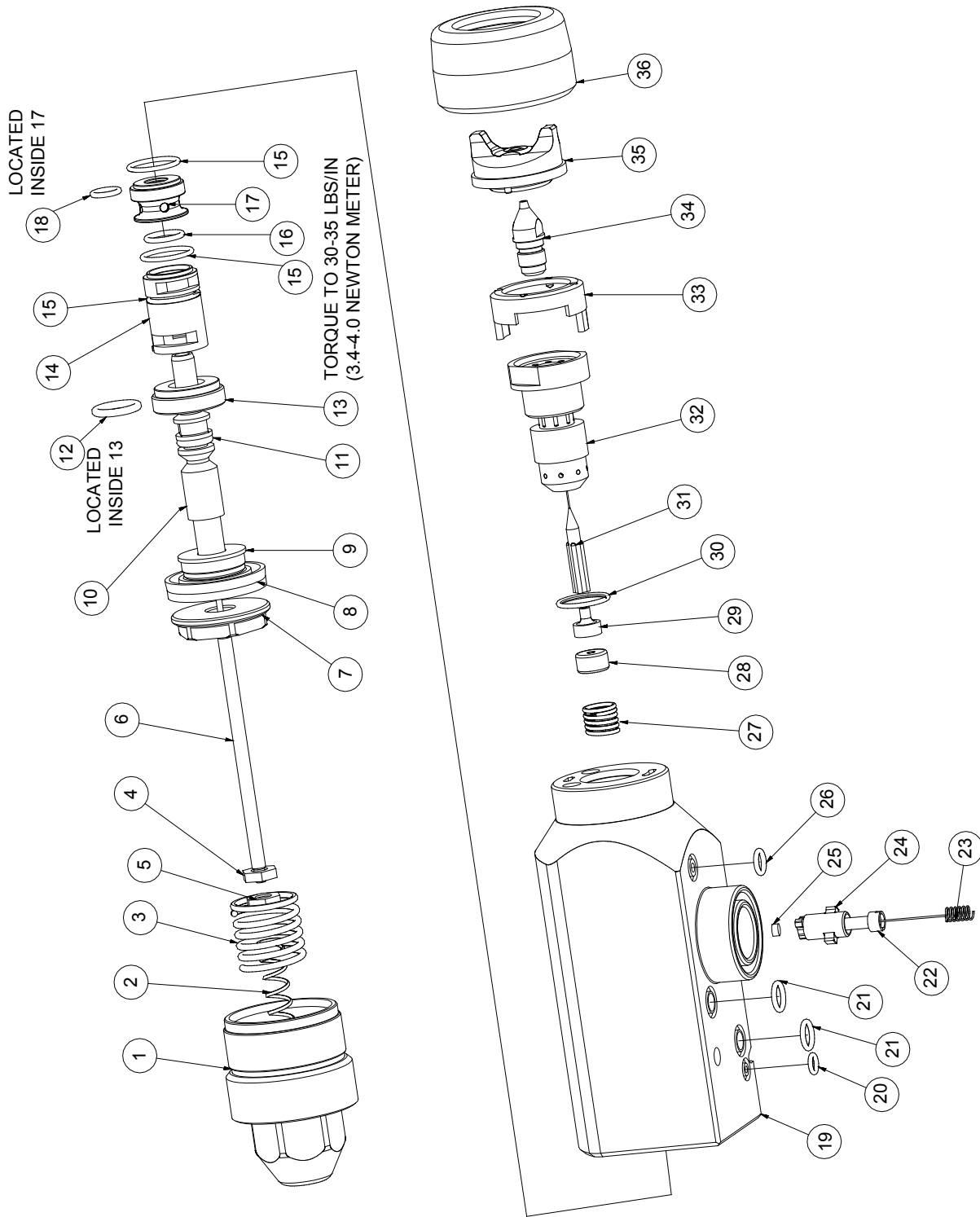


Figure 23: 79138-01 Spray Head Assembly

79138-01 CONVENTIONAL SPRAY HEAD ASSEMBLY - PARTS LIST (Figure 23)

Item #	Part #	Description	Qty
1	79148-00	End Cap, Spray Head	1
2	17615-00	Spring, Compression	1
3	9334-00	Spring, Valve Return	1
4	7733-07	Nut, Jam	1
5	76199-00	Nut, Adjustment Rear	1
6	79151-00	Assembly, Needle Shaft	1
7	79147-00	Nut, Piston	1
8	7723-06	Piston, U-Cup	1
9	79145-00	Plate, Piston	1
10	79144-00	Shaft, Air Valve	1
11	79001-28	O-Ring, Solvent Proof	1
12	79001-29	O-Ring, Solvent Proof	1
13	79146-00	Seal Carrier, Rear Piston	1
14	79143-00	Bushing, Air Valve	1
15	79001-01	O-Ring, Solvent Proof	3
16	13076-13	O-Ring, PTFE	1
17	79172-00	Carrier, Rear Seal	1
18	79001-06	O-Ring, Solvent Proof	1
19	79137-00	Head, Machining	1
20	79001-04	O-Ring, Solvent Proof	1
21	79001-06	O-Ring, Solvent Proof	2
22	79142-00	Screw, SHCS	1
23	79171-00	Spring, Connector	1
24	79141-00	Plug, Connection	1
25	14061-09	Conductive Compressable Contact	1
26	79001-05	O-Ring, Solvent Proof	1
27	RME-38	Return Spring, Piston	1
28	EMF-7	Seal, Washer	1
29	RME-32	Seal	1
30	79001-01	O-Ring, Solvent Proof	1
31	70430-01	Electrode, High Wear	1
32	EMF-195	Nozzle, Fluid Hole (8)	1
33	EMF-192	Locator, Air Cap	1
34	79140-01	Fluid Tip, .042" (1.07mm) Diameter	1
	79140-02	Fluid Tip, .055" (1.40mm) Diameter	1
	79140-03	Fluid Tip, .070" (1.78mm) Diameter	1
35	79153-65R-1	Air Cap, Certified 65R-1	1
	79196-98-1	Air Cap, Certified 98-1	1
	79197-63-1	Air Cap, Certified 63-1	1
36	79154-00	Ring, Retaining	1

79138-02 HVLP SPRAY HEAD ASSEMBLY - PARTS LIST (Figure 23)			
Item #	Part #	Description	Qty
1	79148-00	End Cap, Spray Head	1
2	17615-00	Spring, Compression	1
3	9334-00	Spring, Valve Return	1
4	7733-07	Nut, Jam	1
5	76199-00	Nut, Adjustment Rear	1
6	79151-00	Assembly, Needle Shaft	1
7	79147-00	Nut, Piston	1
8	7723-06	Piston, U-Cup	1
9	79145-00	Plate, Piston	1
10	79144-00	Shaft, Air Valve	1
11	79001-28	O-Ring, Solvent Proof	1
12	79001-29	O-Ring, Solvent Proof	1
13	79146-00	Seal Carrier, Rear Piston	1
14	79143-00	Bushing, Air Valve	1
15	79001-01	O-Ring, Solvent Proof	3
16	13076-13	O-Ring, PTFE	1
17	79172-00	Carrier, Rear Seal	1
18	79001-06	O-Ring, Solvent Proof	1
19	80064-00	Head, Machining (HVLP)	1
20	79001-04	O-Ring, Solvent Proof	1
21	79001-06	O-Ring, Solvent Proof	2
22	79142-00	Screw, SHCS	1
23	79171-00	Spring, Connector	1
24	79141-00	Plug, Connection	1
25	14061-09	Conductive Compressable Contact	1
26	79001-05	O-Ring, Solvent Proof	1
27	RME-38	Return Spring, Piston	1
28	EMF-7	Seal, Washer	1
29	RME-32	Seal	1
30	79001-01	O-Ring, Solvent Proof	1
31	70430-01	Electrode, High Wear	1
33	EMF-192	Locator, Air Cap	1
34	79182-01	Fluid Tip, .028" (.71mm) Diameter (Used with Air Cap 79185-48-1)	1
	79182-02	Fluid Tip, .042" (1.07mm) Diameter (Used with Air Cap 79185-48-1)	1
	79182-03	Fluid Tip, .055" (1.40mm) Diameter (Used with Air Cap 79185-48-1)	1
	79182-04	Fluid Tip, .070" (1.78mm) Diameter (Used with Air Cap 79186-481-1)	1
	79182-05	Fluid Tip, .086" (2.18mm) Diameter (Used with Air Cap 79186-481-1)	1
35	79185-48-1	Air Cap, Certified 48-1 (Used with 79182-01, 02, 03 Tips)	1
	79186-481-1	Air Cap, Certified 481-1 (Used with 79182-04, 05 Tips)	1
36	79154-00	Ring, Retaining	1

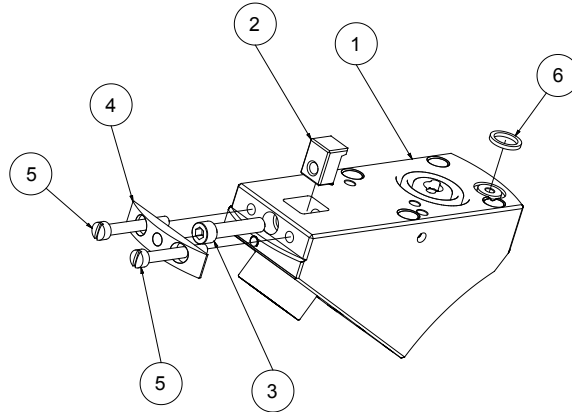


Figure 24: 79179-00 Single Head 60°

79179-00 SINGLE HEAD 60° - PARTS LIST (Figure 24)

Item #	Part #	Description	Qty
1	79188-00	Assembly, Mounting Block 60° Single Head	1
2	79173-00	Block, Locking	1
3	79174-00	Screw, Nylon 1/4-20 x 1-1/4" Long	1
4	79184-00	Plate, Retention	1
5	79149-00	Screw, Retaining #10-32 x .50" Long NY	2
6	A-10612	Square Cut Ring, Solvent Proof	1

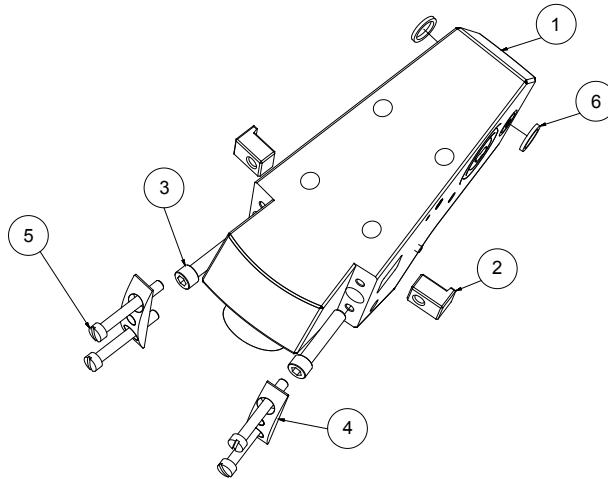


Figure 25: 79243-00 Dual Head 60°

79243-00 DUAL HEAD 60° - PARTS LIST (Figure 25)

Item #	Part #	Description	Qty
1	79242-00	Assembly, 60° Block Dual Head	1
2	79173-00	Block, Locking	2
3	79174-00	Screw, Nylon 1/4-20 X 1-1/4" Long	2
4	79184-00	Plate, Retention	2
5	79149-00	Screw, Retaining #10-32 X .50" Long NY	4
6	A-10612	Square Cut Ring, Solvent Proof	2

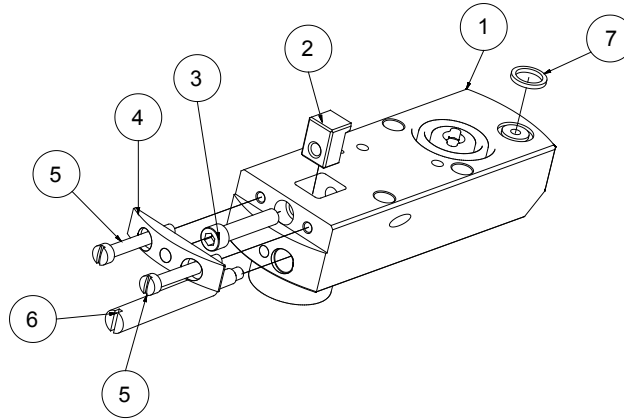


Figure 26: 79180-00 Single Head 90°

79180-00 SINGLE HEAD 90° - PARTS LIST (Figure 26)			
Item #	Part #	Description	Qty
1	79189-00	Assembly, Mounting Block 90° Single Head	1
2	79173-00	Block, Locking	1
3	79174-00	Screw, Nylon 1/4-20 X 1-1/4" Long	1
4	79184-00	Plate, Retention	1
5	79149-00	Screw, Retaining #10-32 X .50" Long NY	2
6	79194-00	Plug, Fluid Flush	1
7	A10612	Square Cut Ring, Solvent Proof	1

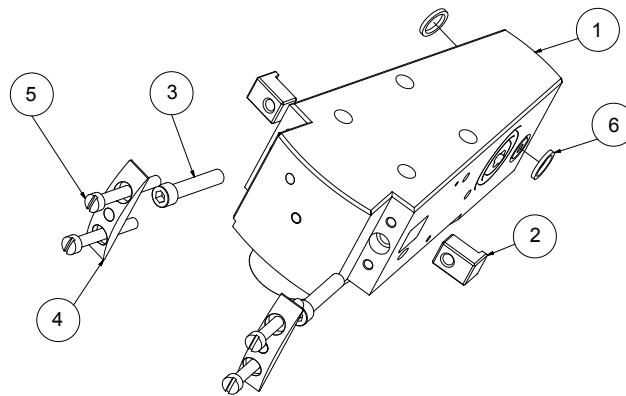


Figure 27: 79224-00 Dual Head 90°

79224-00 DUAL HEAD 90° - PARTS LIST (Figure 27)			
Item #	Part #	Description	Qty
1	79227-00	Assembly, Mounting Block 90° Dual Head	1
2	79173-00	Block, Locking	2
3	79174-00	Screw, Nylon 1/4-20 X 1-1/4" Long	2
4	79184-00	Plate, Retention	2
5	79149-00	Screw, Retaining #10-32 X .50" Long NY	4
6	A-10612	Square Cut Ring, Solvent Proof	2

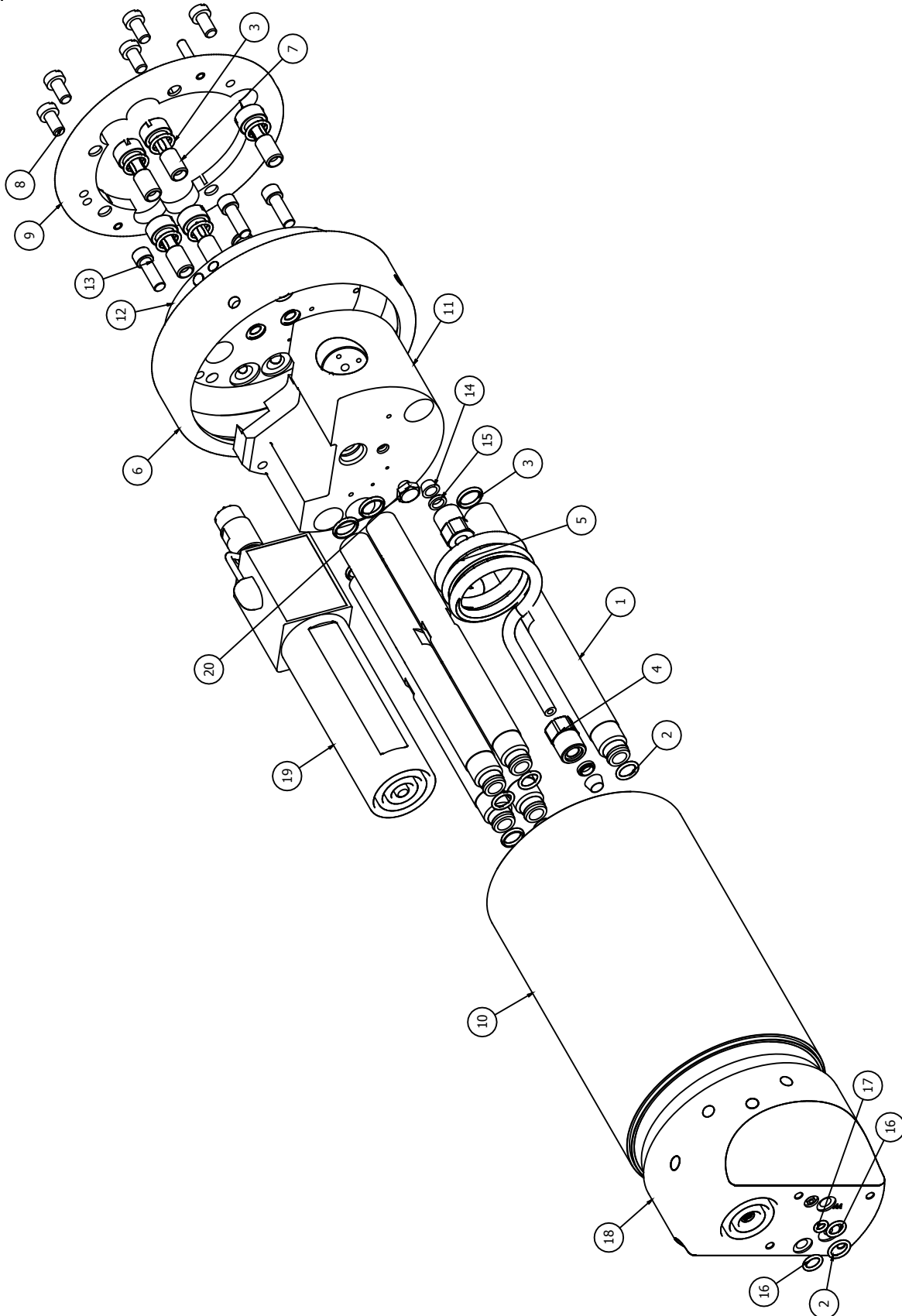


Figure 28: A11981 Manifold Assembly

A11981 MANIFOLD ASSEMBLY - PARTS LIST (Figure 28)			
Item #	Part #	Description	Qty
1	A11214-00	Rod, Support	5
2	79001-14	O-Ring, Solvent Proof	6
3	79001-07	O-Ring, Solvent Proof	10
4	78449-00	Fitting, Fluid	2
5	Table E - "G"	Coil, Fluid	1
6	A11201-00	Ring, Quick Disconnect	1
7	77508-00	Bolt, Air	5
8	7683-16C	Screw, Break-Away	5
9	A11203-00	Assembly, Break-Away Ring	1
10	A11255-00	Shroud, RMA-303	1
11	A11241-01	Assembly, Valve Manifold	1
12	A11206-01	Assembly, Rear Manifold Plate, RMA-303 (Single Purge)	1
13	76566-24C	Screw, 1/4-20 X 3/4" Lg. SHCS	3
14	EMF-203-04	Ferrule, Front, 1/4" Tube	2
15	EMF-202-04	Ferrule, Back, 1/4" Tube	2
16	79001-06	O-Ring, Solvent Proof	2
17	79001-04	O-Ring, Solvent Proof	1
18	A11983-00	Manifold, Evolver 303, Assembly	1
19	79010-01	Cascade Assembly (HP 404 Type), RMA-202	1
20	A11984-00	1/4-20 X 3/8" Hex Cap, SC, Black	1

TABLE E MANIFOLD CONFIGURATION		
Item #	Description	"G"
A11981-01	.25" OD X .125" ID for Highly Resistive Materials (Clear Coat)	77531-00
A11981-02	.25" OD X .125" ID for Conductive Materials (Base/Clear)	77517-00
A11981-03	.25" OD X .125" ID for Highly Conductive Materials (Base/Clear)	78450-00

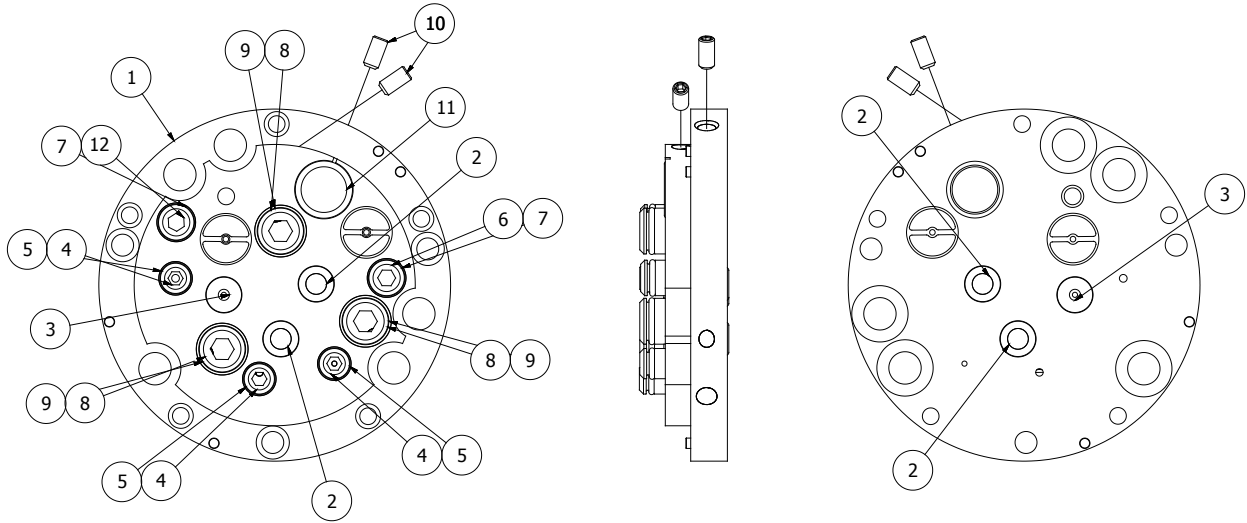


Figure 29: A11206-01 Rear Plate Assembly (Single Purge)

**A11206-01 REAR PLATE ASSEMBLY (SINGLE PURGE)
PARTS LIST (Figure 29)**

Item #	Part #	Description	Qty
1	A11205-00	Assembly, Plate, Rear RMA-303 Single Purge	1
2	79001-40	O-Ring, Solvent Proof	4 2
3	79001-39	O-Ring, Solvent Proof	2 2
4	77507-00	Air Stud, Small Machined	3 1
5	79001-05	O-Ring, Solvent Proof	3 2
6	77506-00	Air Stud, Medium Machined	1 1
7	79001-06	O-Ring, Solvent Proof	2 2
8	77505-00	Air Stud, Large	3 1
9	79001-07	O-Ring, Solvent Proof	3 2
10	SSF-2052	Set Screw, 3/8" Lg X #10-24	2
11	79001-09	O-Ring, Solvent Proof	1 2
12	A12035-00	Air Stud, Medium, Machined, Evolver 303	1 1

PARTS LIST BULLET DEFINITION TABLE - (Figure 29)

- 1 Apply thread sealer 7969-10 to threads prior to assembly.
- 2 Apply a thin film of SSL-11 petroleum jelly to o-rings before assembly.

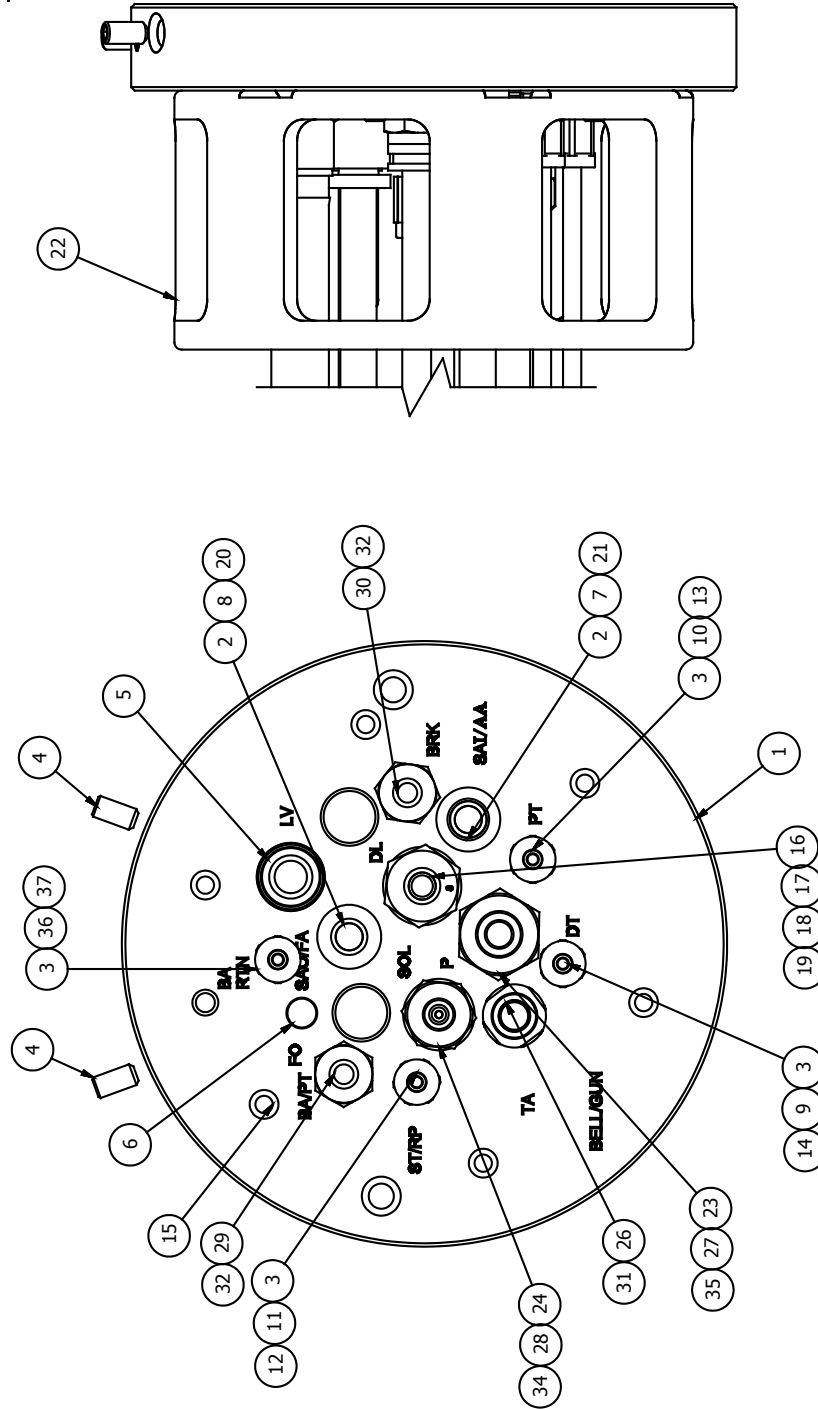
















Figure 30: A12000-XXXXX Tubing Bundle Assembly (English)

A12000-XXXXX TUBING BUNDLE ASSEMBLY (ENGLISH) - PARTS LIST (Figure 30)			
Item #	Part #	Description	Qty
1	A11062-00	Assembly, Robot Mounting Plate	1
2	A10891-03	Fitting, 1/4" BSP X 8mm ODT, Straight	2 
3	77544-01	Male Connector, 4mm ODT X #10-32 Thd.	4 
4	SSF-2052	Set Screw, 3/8" Lg. X #10-24	2
5	See Table G - "I"	Assembly, Cable, Low Voltage	1
6	See Table H - "K"	Fiber Optic Cable	1
7	A10893-07	Tube, 8mm OD X 6mm ID (Blue)	6 ft.
8	A10893-04	Tube, 8mm OD X 6mm ID (Gray)	6 ft.
9	77536-06	Tube, 4mm OD X 2.7mm ID (Silver)	See Table F - "H"
10	77536-03	Tube, 4mm OD X 2.7MM ID (Green)	See Table F - "H"
11	77536-04	Tube, 4mm OD X 2.7mm ID (Blue)	See Table F - "H"
12	77545-01	Cap, 5/32" OD Tube, Blue Identification	1
13	77545-03	Cap, 5/32" OD Tube, Green Identification	1
14	77545-11	Cap, 5/32" OD Tube, Gray Identification	1
15	76566-24C	Screw, 1/4-20 X 3/4" Lg. SHCS	6
16	A10841-02	Tubing, 8mm OD X 6mm ID	See Table F - "H"
17	A11063-00	Insert, Fluid	1 
18	A10890-02	Fitting, 8mm ODT X 1/4" BSP	1 
19	A10895-02	Insert, Metric Tube, 8mm OD	1 
20	A11208-00	Cap, 8mm (Gray)	1
21	A11208-10	Cap, 8mm (Blue)	1
22	See Table I - "L"	Robot Adapter	1 
23	A12001-00	3/8" Male Connector, 1/4" ISO	1 
24	A12002-00	1/4" Male Connector, 1/8" ISO	1 
25	--	--	--
26	A10608-01	Tubing, 3/8" OD X .275" ID, Nylon	6 ft.
27	76698-04	Tubing, PFA 450, PTFE	See Table F - "H"
28	76698-01	Tubing, PFA 450, PTFE	See Table F - "H"
29	A10609-02	Tubing, 1/4" OD X .170" ID, Nylon	See Table F - "H"
30	A10609-01	Tubing, 1/4" OD X .170" ID, Nylon	See Table F - "H"
31	77947-00	Fitting, Air Modified	1 
32	A12003-00	Male Connector, 1/4" T X 1/8" Unifit	2 
33	See Table G - "J"	Extension, Low Voltage Cable (Not Shown)	1
34	77539-02	Insert, Tube	1
35	77539-04	Insert, Tube	1
36	77545-12	Cap, 5/32" OD Tube, Yellow Identification	1
37	77536-07	Tube, 4mm OD X 27mm ID, Yellow	See Table F - "H"

PARTS LIST BULLET DEFINITION TABLE - (Figure 30)	
	Apply 7969-03 to threads as required.
	Install 76566-24C SHCS into robot adapter (Ref.).
	Apply 7969-10 to threads as required.
	Install tube inserts fully into PTFE tubing before installing tubing into fitting.

SIGNAL IDENTIFICATION TABLE (ENGLISH)				
Abbr.	Description	Color	Tubing Material	Tubing Size
B.A/P.T	Bearing Air (Paint Trigger)	Yellow	Nylon	1/4" OD X .170" ID
B.A RTN	Bearing Air Return	Yellow	Nylon	5/32" OD X .106" ID
BRK	Brake Air	Orange	Nylon	1/4" OD X .170" ID
DL	Dump Line	Natural	PTFE	5/16" OD X .250" ID
F.O	Fiber Optic Cable	Natural	Polyethylene	1/4" OD (jacket)
LV	Low Voltage Cable	Black	N/A	N/A
P	Paint In	Natural	PTFE	3/8" OD X .250" ID
PT	Paine Trigger	Green	Nylon	5/32" OD X .106" ID
DT	Dump Trigger	Silver	Nylon	5/32" OD X .106" ID
SA.I/A.A	Inner Shaping Air (Atomizer Air)	Blue	Nylon	5/16" OD X .250" ID
SOL	Solvent In	Natural	PTFE	1/4" OD X .170" ID
SA.O/F.A	Outer Shaping (Fan Air)	Gray	Nylon	5/16" OD X .250" ID
ST/RP	Solvent Trigger Signal	Blue	Nylon	5/32" OD X .106" ID
T.A	Turbine Air	Green	Nylon	3/8" OD X .275" ID

A12000-XXXXX TUBING BUNDLE ASSEMBLY MODEL IDENTIFICATION (ENGLISH)

When ordering, use A12000-ABBCD as indicated by Tables G thru J. Five digits must follow the basic part number, for example:

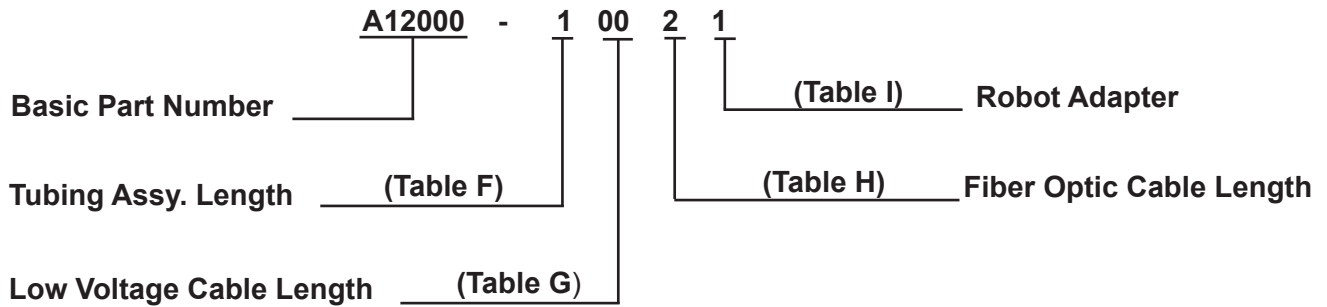


TABLE F TUBING ASSEMBLY LENGTH		
Dash No.	Description	"H" (Length)
0	Air Tubing Not Included	N/A
1	15 Ft. Tubing Assembly	15 Ft.
2	30 Ft. Tubing Assembly	30 Ft.

NOTE: To allow tubes to move freely in the robot wrist and arm, remove all the black electrical tape holding tubing bundle together. This tape is for shipping purposes only. Remove any gummy residue left by tape by wiping with a mild solvent. **Do Not** use any solvent to wipe outer sheathing of low voltage cable.

**TABLE G
LOW VOLTAGE CABLE LENGTH**

Dash No.	Description	"I" (Low Voltage Cable)	"J" (Low Voltage Cable Extension)
00	(Not Included)	----	----
01	25' Low Voltage; Non-Junction Cable	79008-25	----
02	40' Low Voltage; Non-Junction Cable	79008-40	----
03	50' Low Voltage; Non-Junction Cable	79008-50	----
04	75' Low Voltage; Non-Junction Cable	79008-75	----
05	100' Low Voltage; Non-Junction Cable	79008-100	----
06	15' Robot to JB; 15' JB to MicroPak	79008-15J	77062-15
07	15' Robot to JB; 40' JB to MicroPak	79008-15J	77062-40
08	15' Robot to JB; 60' JB to MicroPak	79008-15J	77062-60
09	15' Robot to JB; 75' JB to MicroPak	79008-15J	77062-75
10	25' Robot to JB; 25' JB to MicroPak	79008-25J	77062-25
11	25' Robot to JB; 50' JB to MicroPak	79008-25J	77062-50
12	25' Robot to JB; 75' JB to MicroPak	79008-25J	77062-75
13	40' Robot to JB; 15' JB to MicroPak	79008-40J	77062-15
14	40' Robot to JB; 25' JB to MicroPak	79008-40J	77062-25
15	40' Robot to JB; 40' JB to MicroPak	79008-40J	77062-40
16	40' Robot to JB; 60' JB to MicroPak	79008-40J	77062-60
17	50' Robot to JB; 40' JB to MicroPak	79008-50J	77062-40
31	25' Low Voltage, Non-Junction, Evolver MicroPak	A11353-25	----
32	50' Low Voltage; Non-Junction, Evolver MicroPak	A11353-50	----
33	75' Low Voltage; Non-Junction; Evolver MicroPak	A11353-75	----
34	100' Low Voltage; Non-Junction; Evolver MicroPak	A11353-100	----
35	15' Robot to JB; 15' JB to Evolver MicroPak	A11355-15	A11356-15
36	15' Robot to JB; 40' JB to Evolver MicroPak	A11355-15	A11356-40
37	15' Robot to JB; 60' JB to Evolver MicroPak	A11355-15	A11356-60
38	15' Robot to JB; 75' JB to Evolver MicroPak	A11355-15	A11356-75
39	25' Robot to JB; 25' JB to Evolver MicroPak	A11355-25	A11356-25
40	25' Robot to JB; 50' JB to Evolver MicroPak	A11355-25	A11356-50
41	25' Robot to JB; 75' JB to Evolver MicroPak	A11355-25	A11356-75

TABLE H FIBER OPTIC CABLE LENGTH		
Dash No.	Description	"K"
0	Fiber Optic Cable Not Included	-----
1	15 Ft. Fiber Optic Cable	SMC-424-5
2	25 Ft. Fiber Optic Cable	SMC-424-6
3	50 Ft. Fiber Optic Cable	SMC-424-2
4	75 Ft. Fiber Optic Cable	SMC-424-7
5	100 Ft. Fiber Optic Cable	SMC-424-1
6	40 Ft. Fiber Optic Cable	SMC-424-8

TABLE I ROBOT ADAPTER		
Dash No.	Description	"L"
0	Adapter Not Included	-----
1	Adapter (Fanuc)	78983-00
2	Adapter (ABB)	79107-00
3	Adapter (Fanuc P-200)	79131-00
4	Adapter (Kawasaki - KE610L)	A10847-00
5	Adapter (Motoman - PX2850)	A10848-00
6	Adapter (Motoman - PX2900)	A10849-00
7	Adapter (B & M - LZ2000)	A10851-00

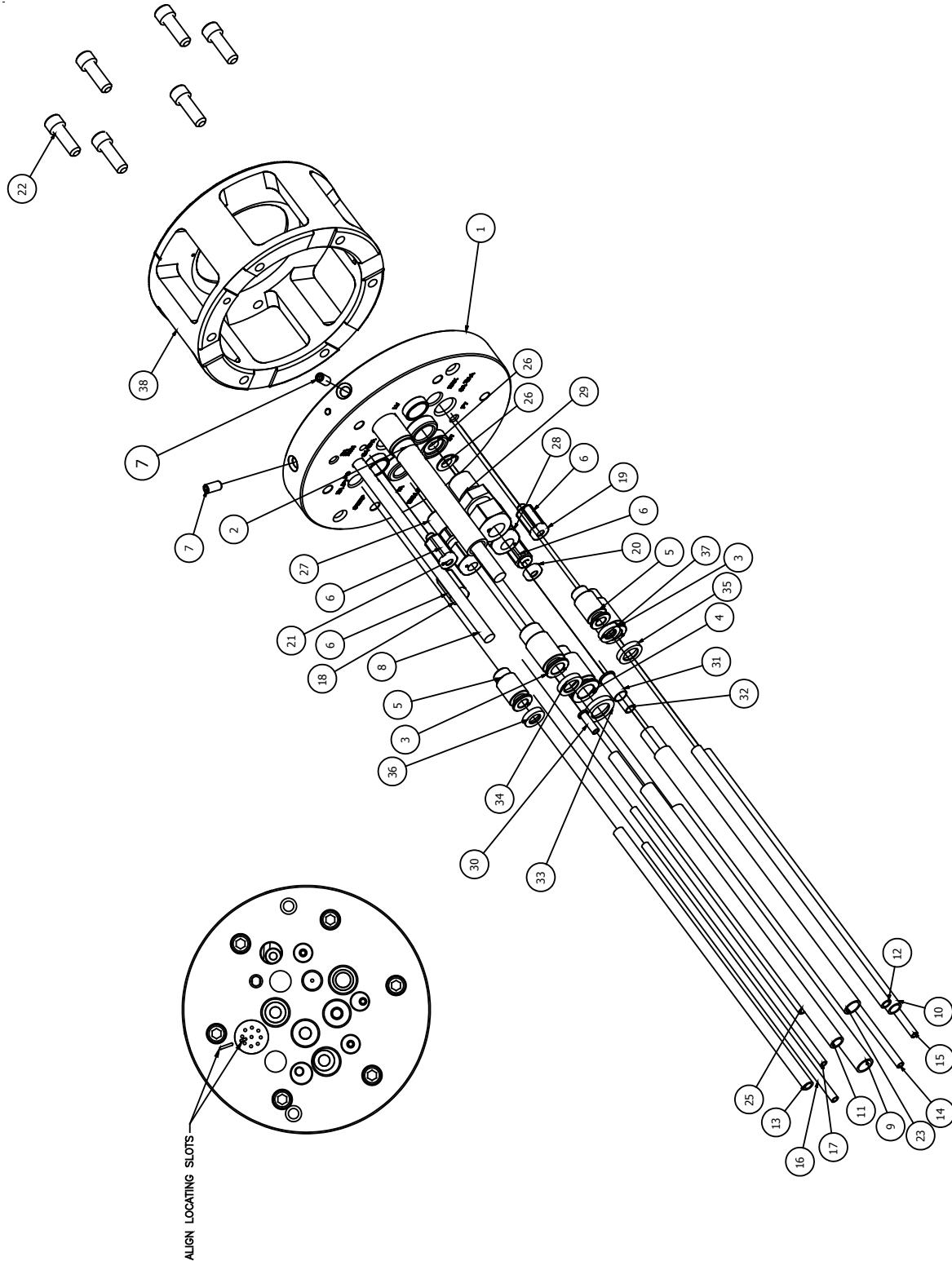

















Figure 31: A11061-XXXXX Tubing Bundle Assembly (Metric)

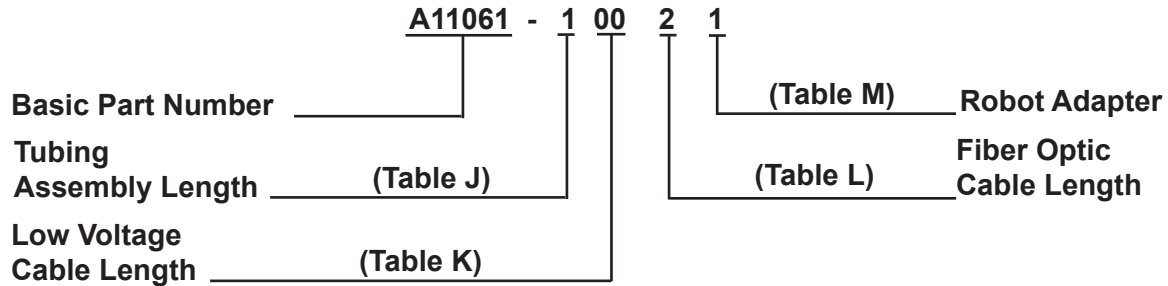
A11061-XXXXX TUBING BUNDLE ASSEMBLY (METRIC) - PARTS LIST (Figure 31)			
Item #	Part #	Description	Qty
1	A11062-00	Assembly, Robot Mounting Plate	1
2	See Table K - "N"	Assembly, Cable Low Voltage	1
3	A10891-03	Fitting, 1/4" BSP X 8mm ODT Straight	2 
4	A10891-04	Fitting, 1/4" BSP X 10mm ODT Straight	1 
5	A10891-02	Fitting, 1/8" BSP X 6mm ODT Straight	2 
6	77544-01	Male Connector, 4mm ODT X #10-32 Thd.	4 
7	SSF-2052	Set Screw, 3/8" Lg. X #10-24	2
8	See Table L - "Q"	Fiber Optic Cable	1
9	A10839-06	Tube, 10mm OD X 8mm ID (Green)	6 Ft.
10	A10893-07	Tube, 8mm OD X 6mm ID (Blue)	6 Ft.
11	A10893-04	Tube, 8mm OD X 6mm ID (Gray)	6 Ft.
12	A10840-09	Tube, 6mm OD X 4mm ID (Orange)	See Table J - "M"
13	A10840-08	Tube, 6mm OD X 4mm ID (Yellow)	See Table J - "M"
14	77536-06	Tube, 4mm OD X 2.7mm ID (Silver)	See Table J - "M"
15	77536-03	Tube, 4mm OD X 2.7mm ID (Green)	See Table J - "M"
16	77536-04	Tube, 4mm OD X 2.7mm ID (Blue)	See Table J - "M"
17	77536-07	Tube, 4mm OD X 2.7mm ID (Yellow)	See Table J - "M"
18	77545-01	Cap, 5/32" OD Tube, Blue Identification	1
19	77545-03	Cap, 5/32" OD Tube, Green Identification	1
20	77545-11	Cap, 5/32" OD Tube, Gray Identification	1
21	77545-12	Cap, 5/32" OD Tube, Yellow Identification	1
22	76566-24C	Screw, 1/4-20 X 3/4" Lg. SHCS	6
23	A10841-01	Tubing, 10mm OD X 8mm ID	See Table J - "M"
24	A10841-02	Tubing, 8mm OD X 6mm ID, PFA PTFE	See Table J - "M"
25	A10841-03	Tubing, 6mm OD X 4mm ID, PFA PTFE	See Table J - "M"
26	A11063-00	Insert, Fluid	2
27	A10890-04	Fitting, 6mm ODT X 1/8" BSP	1 
28	A10890-02	Fitting, 8mm ODT X 1/4" BSP	1 
29	A10891-03	Fitting, 10mm ODT X 1.4" BSP	1 
30	A10895-03	Insert, Metric Tube, 6mm	1 
31	A10895-01	Insert, Metric Tube, 10mm	1 
32	A10895-02	Insert, Metric Tube, 8mm OD	1 
33	A11207-06	Cap, 10mm (Green)	1
34	A11208-08	Cap, 8mm (Gray)	1
35	A11208-10	Cap, 8mm (Blue)	1
36	A11209-05	Cap, 6mm (Yellow)	1
37	A11209-03	Cap, 6mm (Orange)	1
38	See Table M - "R"	Robot Adapter	1 
39	See Table K - "P"	Extension, Low Voltage Cable (Not Shown)	1

PARTS LIST BULLET DEFINITION TABLE - (Figure 31)	
	Apply 7969-03 to threads as required.
	Install 76566-24C (Ref.) SHCS into Robot Adapter.
	Apply 7969-10 to threads as required.
	Install tube inserts fully into PTFE tubing before installing tubing into fitting.

SIGNAL IDENTIFICATION TABLE (METRIC)				
Abbr.	Description	Color	Tubing Material	Tubing Size
B.A/P.T	Bearing Air (Paint Trigger)	Yellow	Nylon	6mm OD X 4mm ID
B.A RTN	Bearing Air Return	Yellow	Nylon	4mm OD X 2.7mm ID
BRK	Brake Air	Orange	Nylon	6mm OD X 4mm ID
DL	Dump Line	Natural	PTFE	10mm OD X 8mm ID
F.O	Fiber Optic Cable	Natural	Polyethylene	1/4" OD (jacket)
LV	Low Voltage Cable	Black	N/A	N/A
P	Paint In	Natural	PTFE	8mm OD x 6mm ID
PT	Paint Trigger	Green	Nylon	4mm OD X 2.7mm ID
DT	Dump Trigger	Silver	Nylon	4mm OD X 2.7mm ID
SA.I/A.A	Inner Shape Air (Atomizer Air)	Blue	Nylon	8mm OD X 6mm ID
SOL	Solvent In	Natural	PTFE	6mm OD X 4mm ID
SA.O/F.A	Outer Shape Air (Fan Air)	Gray	Nylon	8mm OD X 6mm ID
ST/RP	Solvent Trigger Signal	Blue	Nylon	4mm OD X 2.7mm ID
T.A	Turbine Air	Green	Nylon	10mm OD X 8mm ID

A11061-XXXXX TUBING BUNDLE ASSEMBLY MODEL IDENTIFICATION (METRIC)

When ordering, use A11061-ABBCD as indicated by Tables J through M.
Five digits must follow the basic part number, for example:



**TABLE J
TUBING ASSEMBLY LENGTH**

Dash No.	Description	"M"
0	Air Tubing Not Included	----
1	4 1/2m Long Tubing Assembly	4.6m (15 Ft.)
2	9m Long Tubing Assembly	9.2m (30 Ft.)

**TABLE K
LOW VOLTAGE CABLE LENGTH**

Dash No.	Description	"N" (Low Voltage Cable)	"P" (Low Voltage Cable Extension)
00	(Not Included)	----	----
01	25' Low Voltage; Non-Junction Cable	79008-25	----
02	40' Low Voltage; Non-Junction Cable	79008-40	----
03	50' Low Voltage; Non-Junction Cable	79008-50	----
04	75' Low Voltage; Non-Junction Cable	79008-75	----
05	100' Low Voltage; Non-Junction Cable	79008-100	----
06	15' Robot to JB; 15' JB to MicroPak	79008-15J	77062-15
07	15' Robot to JB; 40' JB to MicroPak	79008-15J	77062-40
08	15' Robot to JB; 60' JB to MicroPak	79008-15J	77062-60
09	15' Robot to JB; 75' JB to MicroPak	79008-15J	77062-75
10	25' Robot to JB; 25' JB to MicroPak	79008-25J	77062-25
11	25' Robot to JB; 50' JB to MicroPak	79008-25J	77062-50
12	25' Robot to JB; 75' JB to MicroPak	79008-25J	77062-75
13	40' Robot to JB; 15' JB to MicroPak	79008-40J	77062-15
14	40' Robot to JB; 25' JB to MicroPak	79008-40J	77062-25
15	40' Robot to JB; 40' JB to MicroPak	79008-40J	77062-40
16	40' Robot to JB; 60' JB to MicroPak	79008-40J	77062-60
17	50' Robot to JB; 40' JB to MicroPak	79008-50J	77062-40
31	25' Low Voltage; Non-Junction, Evolver MicroPak	A11353-25	----
32	50' Low Voltage; Non-Junction, Evolver MicroPak	A11353-50	----
33	75' Low Voltage; Non-Junction; Evolver MicroPak	A11353-75	----
34	100' Low Voltage; Non-Junction; Evolver MicroPak	A11353-100	----
35	15' Robot to JB; 15' JB to Evolver MicroPak	A11355-15	A11356-15
36	15' Robot to JB; 40' JB to Evolver MicroPak	A11355-15	A11356-40
37	15' Robot to JB; 60' JB to Evolver MicroPak	A11355-15	A11356-60
38	15' Robot to JB; 75' JB to Evolver MicroPak	A11355-15	A11356-75
39	25' Robot to JB; 25' JB to Evolver MicroPak	A11355-25	A11356-25
40	25' Robot to JB; 50' JB to Evolver MicroPak	A11355-25	A11356-50
41	25' Robot to JB; 75' JB to Evolver MicroPak	A11355-25	A11356-75

**TABLE L
FIBER OPTIC CABLE LENGTH**

Dash No.	Description	"Q"
0	Fiber Optic Cable Not Included	-----
1	15 Ft. Fiber Optic Cable	SMC-424-5
2	25 Ft. Fiber Optic Cable	SMC-424-6
3	50 Ft. Fiber Optic Cable	SMC-424-2
4	75 Ft. Fiber Optic Cable	SMC-424-7
5	100 Ft. Fiber Optic Cable	SMC-424-1
6	40 Ft. Fiber Optic Cable	SMC-424-8

**TABLE M
ROBOT ADAPTER**

Dash No.	Description	"R" (Robot Adapter)
0	Adapter Not Included	-----
1	Adapter (Fanuc)	78983-00
2	Adapter (ABB)	79107-00
3	Adapter (Fanuc P-200)	79131-00
4	Adapter (Kawasaki - KE610L)	A10847-00
5	Adapter (Motoman - PX2850)	A10848-00
6	Adapter (Motoman - PX2900)	A10849-00
7	Adapter (B & M LZ2000)	A10851-00

**A10406 OR LECU5004
MICROPAK CONTROL
UNIT**

ACCESSORIES

Accessories for the Evolver 202 Solventborne spray applicators include:

(See the current "MicroPak" Service Manual supplied with the control unit for service information.)

ACCESSORIES AND SERVICE KITS	
Part #	Description
LSCH0009-00	Dielectric Grease (.88 oz. Tube)
76652-01	Kit for measuring high voltage. (Includes Multi-Function Meter (76634-00) and High Voltage Probe Assembly (76667-00).
76652-02	Kit for measuring short circuit current (SCI), resistance, and sprayability. Includes Multi-Function Meter (76634-00) and Test Lead Assembly. (76664-00).
76652-03	Kit for measuring paint resistivity. (Includes Multi-Function Meter (76634-00) and Paint Probe Assembly (7922-00).
76652-04	Deluxe Kit (Performs all functions listed above.) Includes Multi-Function Meter (76634-00), Paint Probe Assembly (7922-00). Test Lead Assembly (76664-00), and High Voltage Probe Assembly (76667-00).
RPM-32	Pre-Filter Replacement Element
RPM-33	Bearing Air Filter Element
75777-XX	Spray Applicator Covers
74035-XX	Test Air Cap and Gauge Assembly
73896-01	Electrode and Air Cap Protector
79203-00	Tool Kit
77620-00	Valve Plug Kit

75777-XX SPRAY APPLICATOR COVERS	
Part #	Description
75777-01	Single Head Spray Applicator
75777-02	Dual Head Spray Applicator
75777-03	Robot Wrist Flange

74035-XX TEST AIR CAPS AND GAUGE ASSEMBLY	
Part #	Description
74035-21	#65R-1 Test Cap
74035-22	#98-1 Test Cap
74035-23	#63-1 Test Cap
74035-24	#48-1 Test Cap
74035-25	#481-1 Test Cap

The 74035, Test Air Cap and Gauge Assembly, is designed for use with a Test Station or while the applicator is connected to the robot or reciprocator. The test air cap is comprised of two air pressure gauges, pressure gauge stand, special 74061-XX air caps, and all required tubing and fittings.

The air cap has two tapped holes for small barbed tube fittings. The fittings are located so that the gauges connected to them will measure the actual cap pressure of the atomization and pattern air. Using this test cap will assure uniform atomization and pattern quality, regardless of air supply tube lengths from one applicator to another.

73896-01 Electrode and Air Cap Protector

This is a plastic cylinder that fits over the air cap retainer. The protector keeps the electrode and other spray head parts from being damaged during booth cleaning and at other times when the spray applicator is not in use.

79203-00 Tool Kit

Provided with each applicator is a tool kit to aid in the disassembly and assembly of the applicator during servicing.

79203-00 TOOL KIT	
Part #	Description
A10756-00	Valve Removal Tool
A10766-00	Valve Seat Removal Tool
76772-00	Retaining Ring Spanner
A10400-00	Seal Carrier Tool

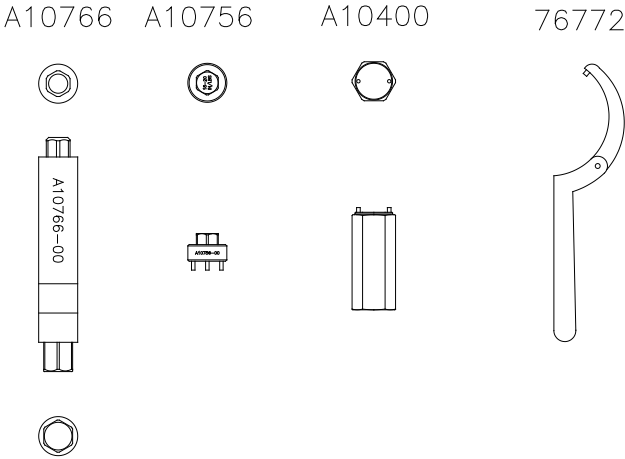


Figure 32: 79203-00 Tool Kit

A10410-00 SPRAY HEAD O-RING KIT

Available for purchase as a kit containing all of the o-rings used for a single Evolver 303 spray head. This kit can be purchased to replace o-rings.

A10410-00 SPRAY HEAD O-RING KIT		
Part #	Description	Qty
79001-04	O-Ring, Solvent Proof	1
79001-06	O-Ring, Solvent Proof	1
79001-05	O-Ring, Solvent Proof	1

A10411-00 Spray Head Repair Kit

Available for purchase as a kit for the common spray head parts that require replacement. This kit contains parts for one applicator head.

A10411 SPRAY HEAD REPAIR KIT		
Part #	Description	Qty
79151-00	Needle Shaft	1
7723-06	Piston, U-Cup	1
79001-28	O-Ring, Solvent Proof	1
79001-29	O-Ring, Solvent Proof	1
13076-13	O-Ring, PTFE	1
RME-38	Spring	1
RME-32	Seal	1
79001-01	O-Ring, Solvent Proof	4
79001-04	O-Ring, Solvent Proof	1
79001-06	O-Ring, Solvent Proof	3
79001-05	O-Ring, Solvent Proof	1

77620-00 Valve Plug Kit

Available for purchase is a Valve Plug Kit than can be used in place of valves and seats to convert the applicator to a single purge applicator.

77620-00 VALVE PLUG KIT (Optional - Use In Place Of Valve & Seat)		
Part #	Description	Qty
79244-00	Plug	1
77618-00	Plug Seat	1
79001-19	O-Ring, Solvent Proof	1
79001-14	O-Ring, Solvent Proof	1

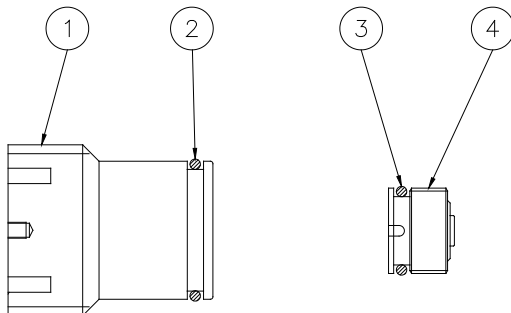


Figure 33: 77620-00 Valve Plug Assembly

Fluid Coils (Separate Sales Parts Only)

If purchasing spare parts, they must be modified as explained.

To ensure proper sealing and holding, the fittings require that the ends of the PTFE fluid coils have a groove cut into them as shown (see Figure 34). Use groove cutter A11567-00 by sliding the end of the tool over the PTFE tubing until it bottoms out. Hold the tubing in one hand and the tool in the other. Make three complete revolutions of the tool, on the tubing, in the direction of the arrow stamped on the tool. To remove the tool, hold the tube and the main body of the tool with one hand, slide the rear portion of the tool back until it stops. Pull out the tubing from the end of the tool. By pulling back the rear portion of the tool, it relieves the pressure of the cutting edge off of the tubing before sliding it out. Trim off ends to dimensions shown. End should be cut off square. Slide the fitting and ferrules onto the tube as shown. The tapered ferrule must go past the newly cut groove to properly lock into place when installed.

Tighten nuts into manifolds by hand until it stops. Using a 9/16" end-wrench, tighten 1/4-1/2 turn.

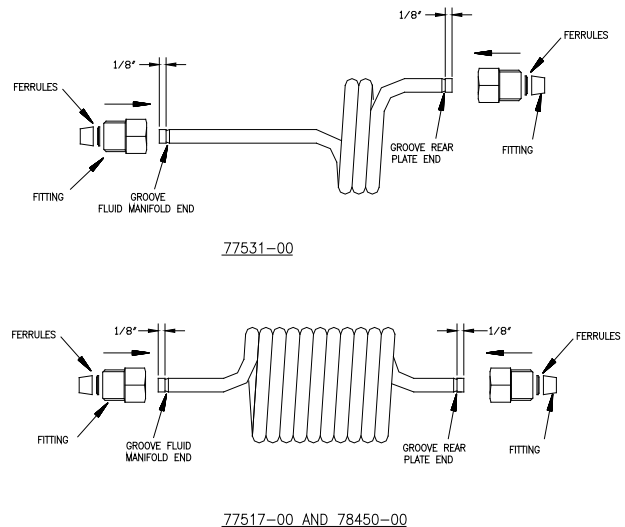


Figure 34: Fluid Coils

REPAIR KITS						
Part #	Description	Number of Applicators				Notes
		1-2	3-4	5-6	7-8	
A10410	Spray Head Mounting Seal O-Ring Kit		1	2	3	4 Includes: 1 ea. - 79001-04 O-Ring (Solvent Proof) 2 ea. - 79001-06 O-Ring (Solvent Proof) 1 ea. - 79001-05 O-Ring (Solvent Proof)
A10411	Spray Head Repair Kit	1	23	4	Includes:	1 ea. - 79151-00 Needle Shaft 1 ea. - 7723-06 Piston, U-Cup 1 ea. - 79001-28 O-Ring (Solvent Proof) 1 ea. - 79001-29 O-Ring (Solvent Proof) 3 ea. - 79001-01 O-Ring (Solvent Proof) 1 ea. - 13076-13 O-Ring (PTFE) 1 ea. - 79001-06 O-Ring (Solvent Proof) 1 ea. - RME-38 Spring 1 ea. - RME-32 Seal 1 ea. - 79001-01 O-Ring (Solvent Proof) 1 ea. - 79001-04 O-Ring (Solvent Proof) 2 ea. - 79001-06 O-Ring (Solvent Proof) 1 ea. - 79001-05 O-Ring (Solvent Proof) 2 ea. - 14061-09 Conductive Foam 1 ea. - 79171-00 Contact Spring

SERVICE PARTS						
Part #	Description	Number of Applicators				Notes
		1-2	3-4	5-6	7-8	
79138-00	Complete Head Assembly	1	2	2	3	
79153-65R-1	Air Cap	1	2	3	4	79196-98-1, 79197-63-1 (Optional Air Caps)
79140-02	Fluid Tip	1	2	3	4	01=.042,03=.070 (Optional Fluid Tips)
70430-01	Electrode	1	2	3	4	
79142-00	Screw	2	2	4	4	
79171-00	Spring, Connector	2	2	4	4	
79141-00	Plug, Connection	2	2	4	4	
14061-09	Conductive Foam	1	1	2	2	
79144-00	Shaft, Air Valve	1	1	2	2	
79143-00	Bushing, Air Valve	1	1	2	2	
79173-00	Block, Locking	2	2	4	4	
79174-00	Screw	1	1	2	2	
77367-00	Seat Assembly	1	1	2	2	

LUBRICANTS AND SEALERS	
Part #	Description
A11545-00	Petroleum Jelly Lubricant for all O-Rings
7969-03	Thread Sealant (Blue), Adhesive 24077
7969-10	Thread Sealant (White), Adhesive 59231, PTFE Paste
7969-05	Thread Sealant (Purple), Adhesive 22221

EVOLVER 303 RECOMMENDED SPARE PARTS (Per Applicator)		
Part #	Description	Qty.
Tubing Bundle		
77539-02	Insert Tube	1
77539-04	Insert Tube	1
A11063-00	Insert, Fluid	1
A10895-02	Insert, Tube, 8mm OD (Metric)	1
76698-04	Tubing, PFA 450, PTFE	--
76698-01	Tubing, PFA 450, PTFE	--
A10841-02	Tubing, 8mm OD X 6mm ID	--
77536-03	Tubing, 5/32" OD X .106" ID, Green, Nylon	--
77536-04	Tubing, 5/32"OD X .106" ID, Blue, Nylon	--
77536-06	Tubing, 5/32" OD X .106" ID, Silver, Nylon	--
A12003-00	Male Connector, 1/4" T X 1/8" Unifit	0-2
A10890-02	Fitting, 8mm ODT X 1/4" BSP	0-1
A12001-00	3/8" Male Connector, 1/4" ISO	1
A12001-00	1/4" Male Connector, 1/8" ISO	1
41-FP-1011	Fitting, Plug, #10-32	0-1
77544-01	Male Connector, 5/32" OD X #10-32 Threaded	5-8
A10839-06	Tube, 10mm OD X 8mm ID (Green)	--
77536-06	Tube, 4mm OD X 2.7" ID (Silver)	--
77536-03	Tube, 4mm OD X 2.7" ID (Green)	--
77536-04	Tube, 4mm OD X 2.7mm ID (Blue)	--
A10841-01	Tubing, 10mm OD X 8mm ID	--
A10841-02	Tubing, 8mm OD X 6mm ID	--
A10841-03	Tubing, 6mm OD X 4mm ID	--
A11063-00	Insert, Fluid	2
A10890-04	Fitting, 6mm ODTX 1/8" BSP	0-1
A10890-02	Fitting, 8mm ODT X 1/4" BSP	0-1
A10890-03	Fitting, 10mm ODT X 1/4" BSP	0-2
A10895-03	Insert, Tube, 6mm OD (Metric)	1
A10895-01	Insert, Tube, 10mm OD (Metric)	2
A10895-02	Insert, Tube, 8mm OD (Metric)	3
77544-01	Male Connector, 5/32" OD X #10-32 Threaded	5-8
A79008-XX	Low Voltage Cable	1
77062-XX	Low Voltage Cable, HP 404, Extension	1
A11353-XX	Cable Assembly, Low Voltage, Evolver MicroPak	1
A11356-XX	Low Voltage Cable, HP 404, Extension, Evolver MicroPak	1
Evolver 303 Manifold		
79010-01	Cascade Assembly, HP 404	1
7683-16C	Break-Away Screw	4
EMF-203-04	Front Ferrule, 1/4" OD, Tubing	2
EMF-202-04	Back Rerrule, 1/4" OD, Tubing	2
79001-04	O-Ring, Solvent Proof	1
79001-05	O-Ring, Solvent Proof	3
79001-06	O-Ring, Solvent Proof	4
79001-07	O-Ring, Solvent Proof	10
79001-09	O-Ring, Solvent Proof	1
79001-14	O-Ring, Solvent Proof	6
79001-39	O-Ring, Solvent Proof	2
79001-40	O-Ring, Solvent Proof	4

(Continued On Next Page)

EVOLVER 303 RECOMMENDED SPARE PARTS (Per Applicator) (Cont.)		
Part #	Description	Qty.
Evolver 303 Manifold (Cont.)		
76566-24C	Screw, 1/4-20 X 3/4" SHCS	4-6
77517-00	Coiled Tube, 1/4" OD X .170" ID, PFA, Conductive Materials	0-1
78450-00	Coiled Tube, 1/4" OD X .125" ID, PFA, Highly Conductive Materials	0-1
77531-00	Coiled Tube, 1/4" OD X .125" ID, PFA, High Resistive Materials	0-1
A11981-XX	Complete Evolver 303	1
79173-00	Block, Locking	2
79142-00	Screw, #8-32 X .75" Lg. SHCS, Fiberglass	3
A10612-00	Ring, Square Cut	2-4
LSFA0027-00	Screw, Fillister HD, #10-32, Fiberglass	0-4
79206-00	Screw, Fillister HD, #10-32 X 2 1/4" Lg.	0-4
79174-00	Screw, 1/4-20 X 1 1/4" Lg., Nylon	2-4
79141-00	Connection Plug	1
A10756-00	Valve Removal Tool	Accessory
A10766-00	Valve Seat Removal Tool	Accessory
A10400-00	Seal Carrier Tool	Accessory
76772-00	Retaining Ring Spanner	Accessory
LSCH0009-00	Dielectric Grease	1
78949-00	Fluid Valve Assembly	2
77367-00	Valve Seat Assembly	2
A11214-00	Support Rod	2-3
77508-00	Air Bolt	2-3
77507-00	Air Stud, Small	2
77506-00	Air Stud, Medium	2
77505-00	Air Stud, Large	2
Evolver 303 Applicator Head		
9334-00	Spring, Valve Return	2
70430-01	Electrode, High Flex	4
79148-00	End Cap, Spray Head	3
EMF-7	Seal, Washer	4
RME-32	Seal	4
79151-00	Assembly, Needle Shaft	1
79001-01	O-Ring, Solvent Proof	8
79001-04	O-Ring, Solvent Proof	2
79001-05	O-Ring, Solvent Proof	2
79001-06	O-Ring, Solvent Proof	8
79001-07	O-Ring, Solvent Proof	4
79001-08	O-Ring, Solvent Proof	4
79001-09	O-Ring, Solvent Proof	6
79001-14	O-Ring, Solvent Proof	2
79001-16	O-Ring, Solvent Proof	6
79001-28	O-Ring, Solvent Proof	2
79001-29	O-Ring, Solvent Proof	2
79001-31	O-Ring, Solvent Proof	2
79153-65R-1	Air Cap, Pinned	0-3
79185-48-1		

(Continued On Next Page)

EVOLVER 303 RECOMMENDED SPARE PARTS (Per Applicator) (Cont.)		
Part #	Description	Qty.
Evolver 303 Applicator Head (Cont.)		
EMF-195	Nozzle, Fluid Hole (8)	0-3
79183-00		
79140-02	Fluid Tip, 0.055" Diameter	0-3
79182-03		
79154-00	Retaining Ring, Tapered	2
79137-00	Head, Machined, Robot Applicator	1
75777-XX	Applicator Covers	Accessory
13076-13	O-Ring, .566" OD X .426" ID, PTFE	2
79146-00	Seal, Rear Piston	1
7723-06	Piston, U-Cup	1
79138-XX	Complete Spray Head	1

WARRANTY POLICIES

LIMITED WARRANTY

Ransburg will replace or repair without charge any part and/or equipment that fails within the specified time (see below) because of faulty workmanship or material, provided that the equipment has been used and maintained in accordance with Ransburg's written safety and operating instructions, and has been used under normal operating conditions. Normal wear items are excluded.

THE USE OF OTHER THAN RANSBURG APPROVED PARTS VOIDS ALL WARRANTIES.

SPARE PARTS: One hundred and eighty (180) days from date of purchase, except for rebuilt parts (any part number ending in "R") for which the warranty period is ninety (90) days.

EQUIPMENT: When purchased as a complete unit, (i.e., guns, power supplies, control units, etc.), is one (1) year from date of purchase. **WRAPPING THE APPLICATOR IN PLASTIC WILL VOID THIS WARRANTY.**

RANSBURG'S ONLY OBLIGATION UNDER THIS WARRANTY IS TO REPLACE PARTS THAT HAVE FAILED BECAUSE OF FAULTY WORKMANSHIP OR MATERIALS. THERE ARE NO IMPLIED WARRANTIES NOR WARRANTIES OF EITHER MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. RANSBURG ASSUMES NO LIABILITY FOR INJURY, DAMAGE TO PROPERTY OR FOR CONSEQUENTIAL DAMAGES FOR LOSS OF GOODWILL OR PRODUCTION OR INCOME, WHICH RESULT FROM USE OR MISUSE OF THE EQUIPMENT BY PURCHASER OR OTHERS.

EXCLUSIONS:

If, in Ransburg's opinion the warranty item in question, or other items damaged by this part was improperly installed, operated or maintained, Ransburg will assume no responsibility for repair or replacement of the item or items. The purchaser, therefore will assume all responsibility for any cost of repair or replacement and service related costs if applicable.

Service Manual Price: €40.00 (Euro)
\$50.00 (U.S.)

Manufacturing

1910 North Wayne Street
Angola, Indiana 46703-9100
Telephone: 260/665-8800
Fax: 260/665-8516
www.ransburg.com

Technical/Service Assistance

Telephone: 800/ 233-3366
Fax: 419/ 470-2071

Technical Support Representative will direct you to the appropriate telephone number for ordering Spare Parts.