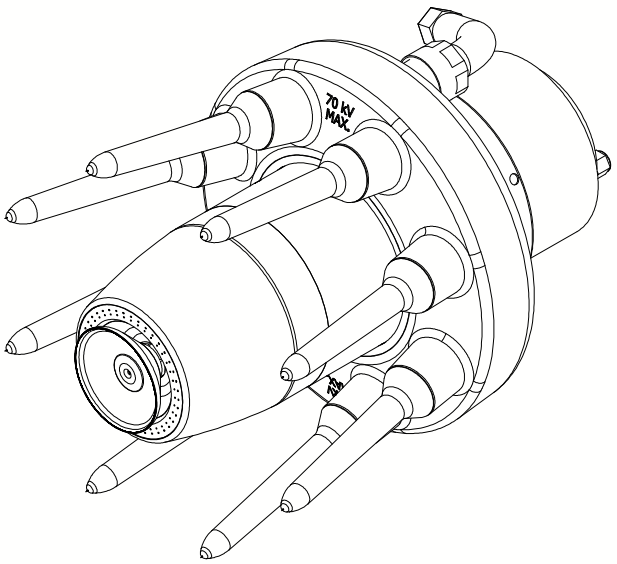
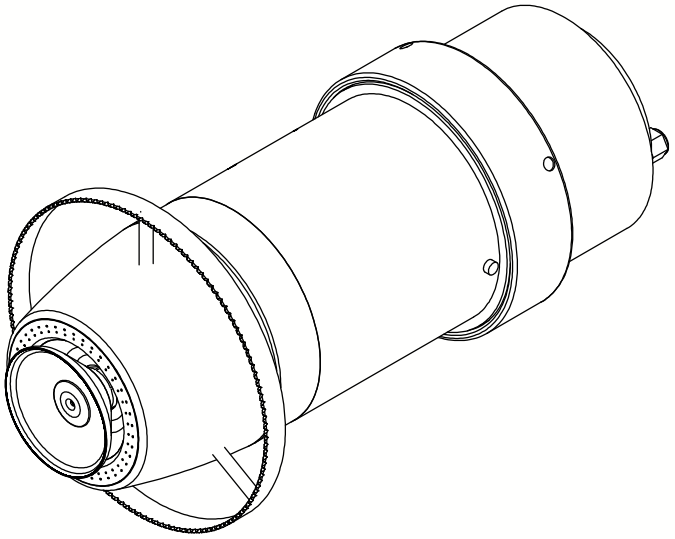
**SERVICE MANUAL**
**LN-9269-11.3**
(REPLACES: LN-9269-11.2)
April — 2013

Ransburg

# *MMA-303 DIRECT/INDIRECT CHARGE ROBOT AND MACHINE MOUNTED ROTARY ATOMIZER*



## MODEL:A12870

**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: $50.00 (U.S.)**

# CONTENTS

# 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.

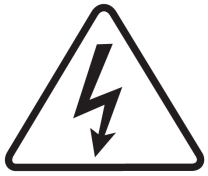
➤ This manual **MUST** be read and thoroughly understood by **ALL** personnel who operate, clean or maintain this equipment! Special care should be taken to ensure that the **WARNINGS** and safety requirements for operating and servicing the equipment are followed. The user should be aware of and adhere 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.

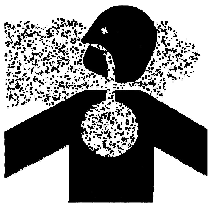
**! WARNING**

➤ 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.

| AREA<br>Tells where hazards may occur. | HAZARD<br>Tells what the hazard is. | SAFEGUARDS<br>Tells how to avoid the hazard. |
|---|---|---|
| **Spray Area**<br>  | **Fire Hazard**<br>Improper or inadequate operation and maintenance procedures will cause a fire hazard.<br>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. | Fire extinguishing equipment must be present in the spray area and tested periodically.<br>Spray areas must be kept clean to prevent the accumulation of combustible residues.<br>Smoking must never be allowed in the spray area.<br>The high voltage supplied to the atomizer must be turned off prior to cleaning, flushing or maintenance.<br>When using solvents for cleaning:<br>• Those used for equipment flushing should have flash points equal to or higher than those of the coating material.<br>• Those used for general cleaning must have flash points above 100°F (37.8°C).<br>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.<br>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.<br>Test only in areas free of combustible material.<br>Testing may require high voltage to be on, but only as instructed.<br>Non-factory replacement parts or unauthorized equipment modifications may cause fire or injury.<br>If used, the key switch bypass is intended for use only during setup operations. Production should never be done with safety interlocks disabled.<br>Never use equipment intended for use in waterborne installations to spray solvent based materials.<br>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. |

| **AREA**<br>Tells where hazards may occur. | **HAZARD**<br>Tells what the hazard is. | **SAFEGUARDS**<br>Tells how to avoid the hazard. |
|---|---|---|
| **Spray Area**<br>  | **Explosion Hazard**<br><br>Improper or inadequate operation and maintenance procedures will cause a fire hazard.<br><br>Protection against inadvertent arcing that is capable of causing fire or explosion is lost if any safety interlocks are disabled during operation.<br><br>Frequent Power Supply or Controller shutdown indicates a problem in the system requiring correction. | 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.<br><br>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.<br><br>Test only in areas free of flammable or combustible materials.<br><br>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.<br><br>Always turn the control panel power off prior to flushing, cleaning, or working on spray system equipment.<br><br>Before turning high voltage on, make sure no objects are within the safe sparking distance.<br><br>Ensure that the control panel is interlocked with the ventilation system and conveyor in accordance with NFPA-33, EN 50176.<br><br>Have fire extinguishing equipment readily available and tested periodically. |
| **General Use and Maintenance**<br>  | Improper operation or maintenance may create a hazard.<br><br>Personnel must be properly trained in the use of this equipment. | Personnel must be given training in accordance with the requirements of NFPA-33, EN 60079-0.<br><br>Instructions and safety precautions must be read and understood prior to using this equipment.<br><br>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. |

| **AREA**<br>Tells where hazards may occur. | **HAZARD**<br>Tells what the hazard is. | **SAFEGUARDS**<br>Tells how to avoid the hazard. |
|---|---|---|
| **Spray Area / High Voltage Equipment**<br>  | **Electrical Discharge**<br><br>There is a high voltage device that can induce an electrical charge on ungrounded objects which is capable of igniting coating materials.<br><br>Inadequate grounding will cause a spark hazard. A spark can ignite many coating materials and cause a fire or explosion. | Parts being sprayed and operators in the spray area must be properly grounded.<br><br>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.)<br><br>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.<br><br>Operators must not be wearing or carrying any ungrounded metal objects.<br><br>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.<br><br>NOTE: REFER TO NFPA-33 OR SPECIFIC COUNTRY SAFETY CODES REGARDING PROPER OPERATOR GROUNDING.<br><br>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.<br><br>Always turn off the power supply prior to flushing, cleaning, or working on spray system equipment.<br><br>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. |
| | | |

| AREA<br>Tells where hazards may occur. | HAZARD<br>Tells what the hazard is. | SAFEGUARDS<br>Tells how to avoid the hazard. |
|---|---|---|
| **Electrical Equipment**<br>  | **Electrical Discharge**<br>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.<br><br>Protection against inadvertent arcing that may cause a fire or explosion is lost if safety circuits are disabled during operation.<br><br>Frequent power supply shutdown indicates a problem in the system which requires correction.<br><br>An electrical arc can ignite coating materials and cause a fire or explosion. | 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.<br><br>Turn the power supply OFF before working on the equipment.<br><br>Test only in areas free of flammable or combustible material.<br><br>Testing may require high voltage to be on, but only as instructed.<br><br>Production should never be done with the safety circuits disabled.<br><br>Before turning the high voltage on, make sure no objects are within the sparking distance. |
| **Toxic Substances**<br>  | **Chemical Hazard**<br>Certain materials may be harmful if inhaled, or if there is contact with the skin. | Follow the requirements of the Material Safety Data Sheet supplied by coating material manufacturer.<br><br>Adequate exhaust must be provided to keep the air free of accumulations of toxic materials.<br><br>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. |

| **AREA**<br>Tells where hazards may occur. | **HAZARD**<br>Tells what the hazard is. | **SAFEGUARDS**<br>Tells how to avoid the hazard. |
|---|---|---|
| **Spray Area**<br>  | **Explosion Hazard—Incompatible Materials**<br>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. | 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. |

# N O T E S

# INTRODUCTION

## FEATURES

Features which make the MM-303 advantageous for use in electrostatic applications include:

- 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 applications.
- Proven long life turbine motor capable of speeds up to 70 krpm. (See “Specifications” in the “Introduction” section of this manual for bell cup speed ratings.)
- Serrated and non-serrated bell cups are available for application flexibility and color match. Most cups are Titanium for extended life.
- Independent shaping air passages provide a wide range of pattern size options at low air consumption.
- Aerodynamic design for ease of cleaning external surfaces.
- Speed control uses reliable magnetic pickup for fiber optic transmission of rotational speed data.
- Internal and external bell wash is quick and efficient. Heated bell wash material is circulated at the mounting manifold.
- Less waste to the spray booth, with the dump valve located internally next to the feed tube.
- Compact high voltage control system. The MicroPak™ Cascade control takes only 1/4 of the space in a 19-inch Euro rack, leaving room for additional control modules.
- Large range of fluid tip sizes available.
- The MMA-303 can be easily changed from Indirect Charge applications for waterborne paints to Direct Charge applications for applying solvent borne coatings.

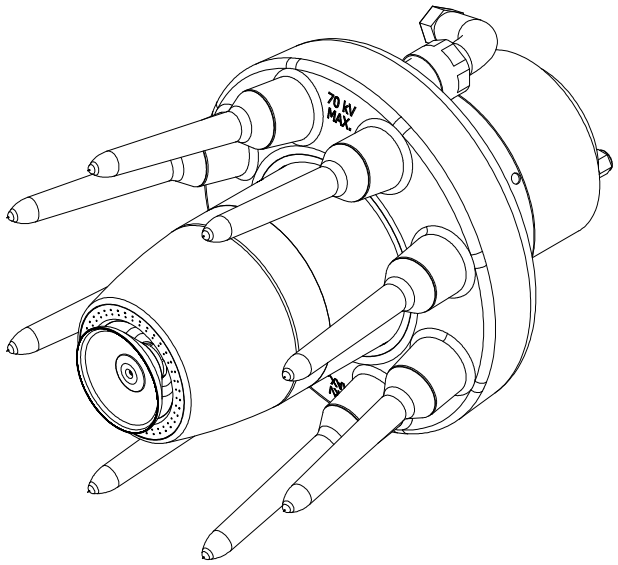



**Figure 1: MMA-303 Indirect Charge**

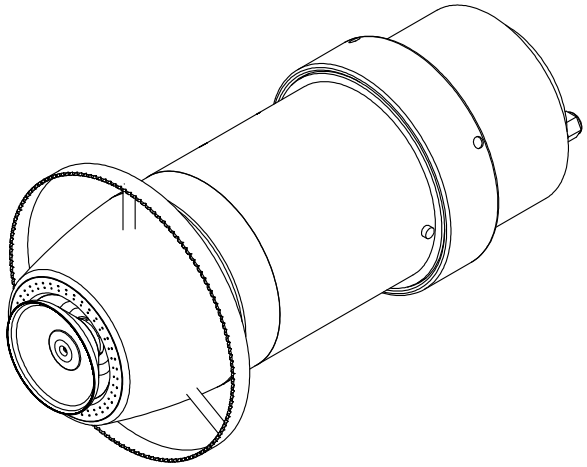


**Figure 2: MMA-303 Direct Charge**

# GENERAL DESCRIPTION

### MMA-303 Direct and Indirect Charge

The MMA-303 can be configured for direct charging of solvent borne paints. By simply removing the high voltage ring and adjusting the high voltage cable input position, the MMA-303 can be used with a wide range of solvent borne paints.

The MMA-303 can also be configured as an indirect (external) charging electrostatic applicator for use with grounded waterborne fluid systems.

### Bell Cup Assembly

All bell cups are made of high strength Titanium. Bell cup assemblies are available in 65mm serrated, non-serrated for base coat applications and 55mm or 65mm serrated for clear coat and primer applications. A 30mm and 55mm aluminum bell cup is available.

### Air Bearing Turbine Assembly

The air bearing turbine assembly with bell cup is secured to the turbine manifold assembly with a turbine retaining ring.

### Turbine Manifold Assembly

The assembly is secured to the mounting manifold assembly with a quick disconnect ring which allows for easy installation and inspection.

### Mounting Manifold Assembly

The air and fluid ports are compactly oriented for use in robotic or machine mount applications. A wrist adapter is available for adapting to virtually any robot mounting configuration.

### Power Supply and Controls

The High Voltage Cascade (74793-XX) is located outside the MMA-303 and is controlled by the MicroPak control unit. The low voltage output of the MicroPak is multiplied by the cascade to the high voltage level required. The high voltage output of the MicroPak is multiplied by the cascade to the high voltage level required. The high voltage is supplied to the atomizer by a High Voltage Cable (A10560-XX). A low voltage cable interconnects the cascade and the MicroPak control. The MicroPak format is designed to fit in a conventional 19-inch or 10-inch rack and requires a 24 power input at a maximum 3 amps.

The MicroPak is designed to electronically limit current to provide safe operation in a spray booth. The voltage and current draw of the atomizer 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 MMA-303 and MicroPak can be controlled by a programmable controller. A Serial Atomizer Module pneumatically controls the speed of the rotary atomizer with dynamic feedback through a fiber optic transmitter located on the applicator. A Serial Digital Module pneumatically controls the paint, solvent, and dump valves located on the atomizer. An I/O module provides communication between these modules and the PLC.

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

## SPECIFICATIONS - Electrical / Mechanical

| | |
|---|---|
| **Electrical** | |
| **Power Supply Type:** | MicroPak |
| **Charging Method:** | Direct and Indirect |
| **Output Voltage:** | 100 kV Maximum - Direct // 30-70 kV Variable - Indirect |
| **Output Current:** | 1000 µA |
| **Turbine Speed Control:** | Atomizer Module |
| **Part Spray ability:** | Determine spray ability of part to be coated using Test Equipment (76652) (Paint Conductivity Meter) |
| **Mechanical** | |
| **Length:** | (See “MMA-303 Tool Center Point Dimension” figures in the “Introduction” section.) |
| **Diameter:** | (See “MMA-303 Tool Center Point Dimension” figures in the “Introduction” section.) |
| **Approximate Weight:** | (See “MMA-303 Tool Point Dimension” figures in the “Introduction” section.) |
| **Turbine Type:** | Air Bearing Impulse Drive |
| **Turbine Air Supply:** | Variable (See “Pressure Flow Data Charts” in the “Introduction” section.) |
| **Maximum/Minimum Turbine Speed:** | Continuous 70K rpm max./20K rpm min. |
| **Maximum Angular Velocity for Turbine (Robot Motion):** | 250˚/sec. |
| **Bearing Air Supply at the Applicator:** | 90 psig (±10 psi) |
| **(Nominal):** | 621 kPa ± 69 kPa) |
| | 2.9 SCFM (82 slpm) |
| **Shaping Air #1 (SAI) Supply:** | Variable (See “Pressure Flow Data Charts” in the “Introduction” section.) |
| **Shaping Air #2 (SAO) Supply:** | Variable (See “Pressure Flow Data Charts” in the “Introduction” section.) |
| **Brake Air Supply:** | 60-100 psig |
| **(Nominal):** | (414-689 kPa) |

## SPECIFICATIONS (Continued)

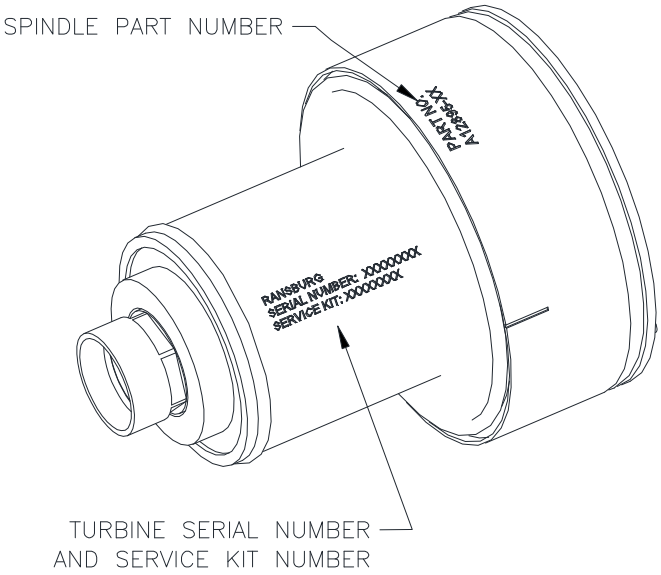
| | |
|---|---|
| **Mechanical (Continued)** | |
| **Maximum Fluid Pressure Supply** | |
| **Paint:** | 200 psi (1379 kPa) |
| **Solvent:** | 150 psi (1035 kPa) |
| **Fluid Flow Rate:** | 25-700 cc/min. (Maximum 300 cc/min. on 30mm Bell Cup) |
| **Bell Cup Cleaning Time** | |
| **(Internal/External):** | 2.7 sec. (approx.) |
| **Color Change Time:** | Dependent on system configuration, fluid pressures, fluid viscosity, fluid line lengths, etc. |
| **Speed Readout:** | Magnetic pick-up, unidirectional fiber optic transmission |
| **Bell Cup Replacement Time:** | Less than 2 min. |
| **Minimum Control Equipment** | |
| **Requirements:** | (Versions listed or higher) |
| **MicroPak** | LECU5004-11 (V.3.84) |
| **Atomizer Module** | A11925-00 (V.0.4) |
| **I/O Module** | A11435-00 (V1.4) (0.01V) (4-20 mA) |

**** Specifications and ratings based on testing at sea level standard conditions.***

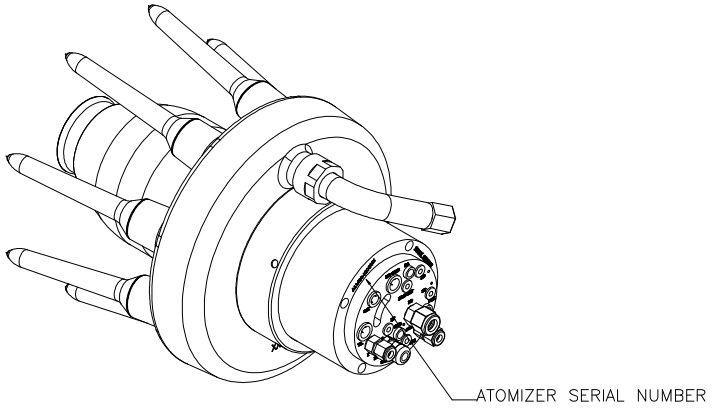
## IMPORTANT NUMBERS

Record these numbers in a log book for future reference.

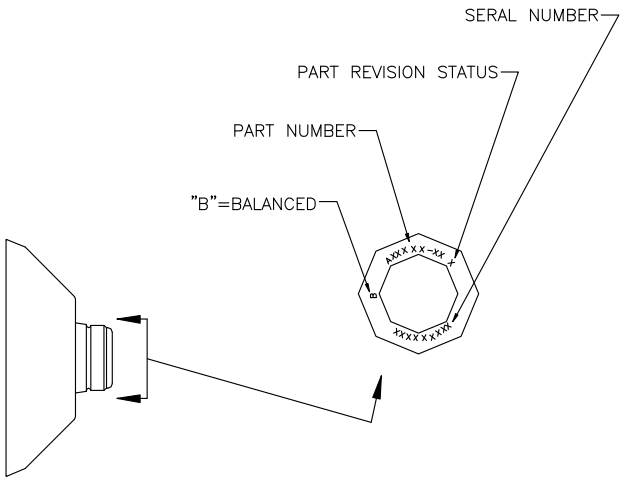
The last digits of the Atomizer serial number are also the Turbine serial numbers.




**Turbine Serial Number**

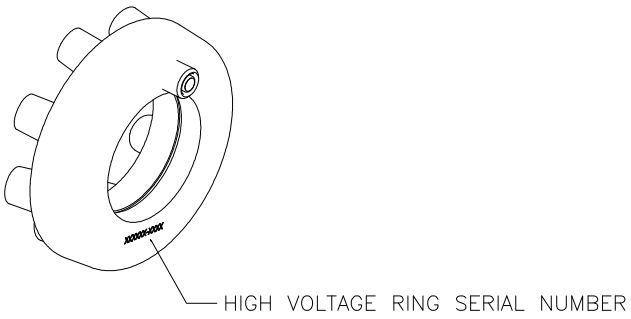



**Atomizer Serial Number**




**Bell Cup Part Numbers/Serial Number**

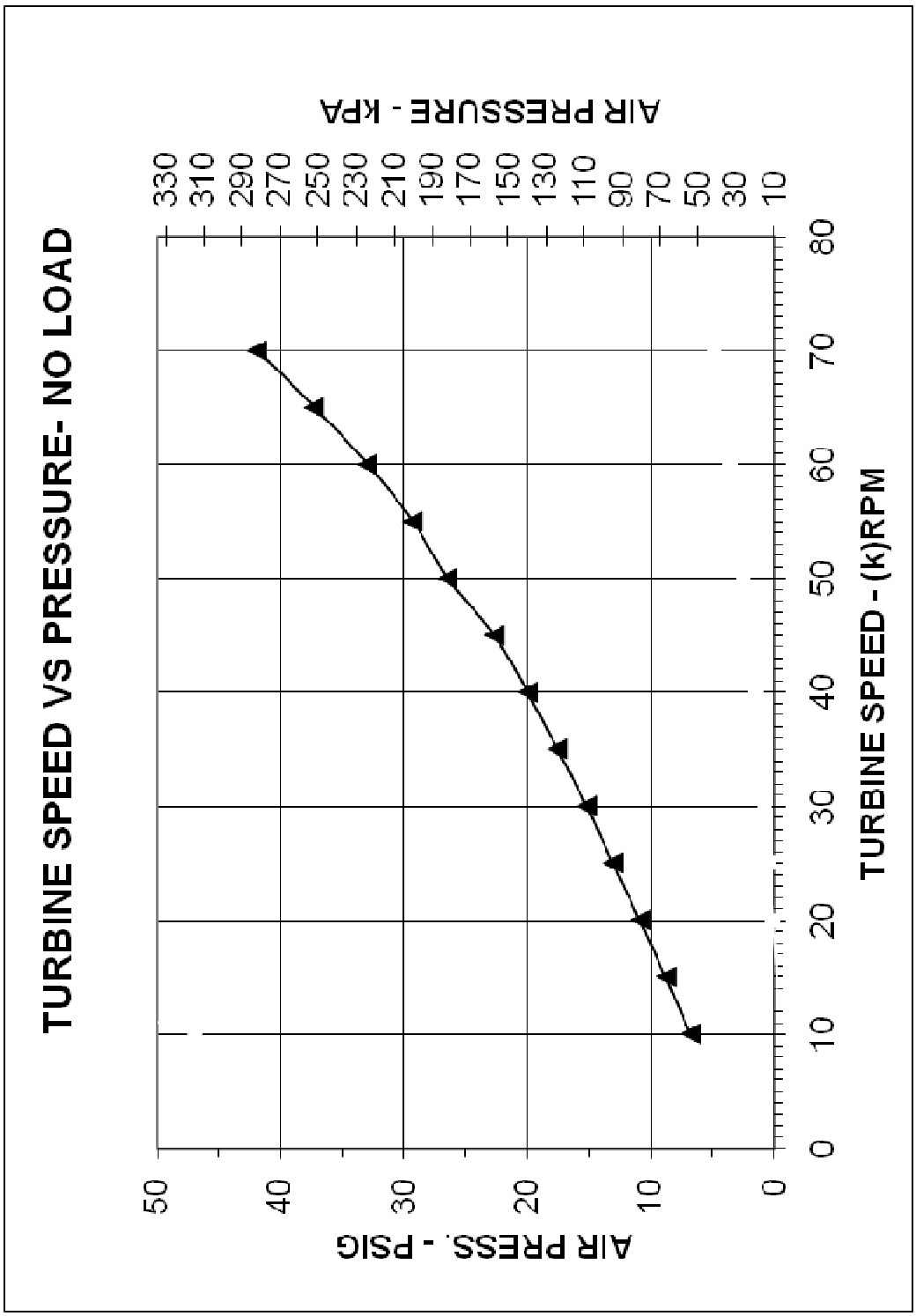
**(cup only, not with splash plate)**

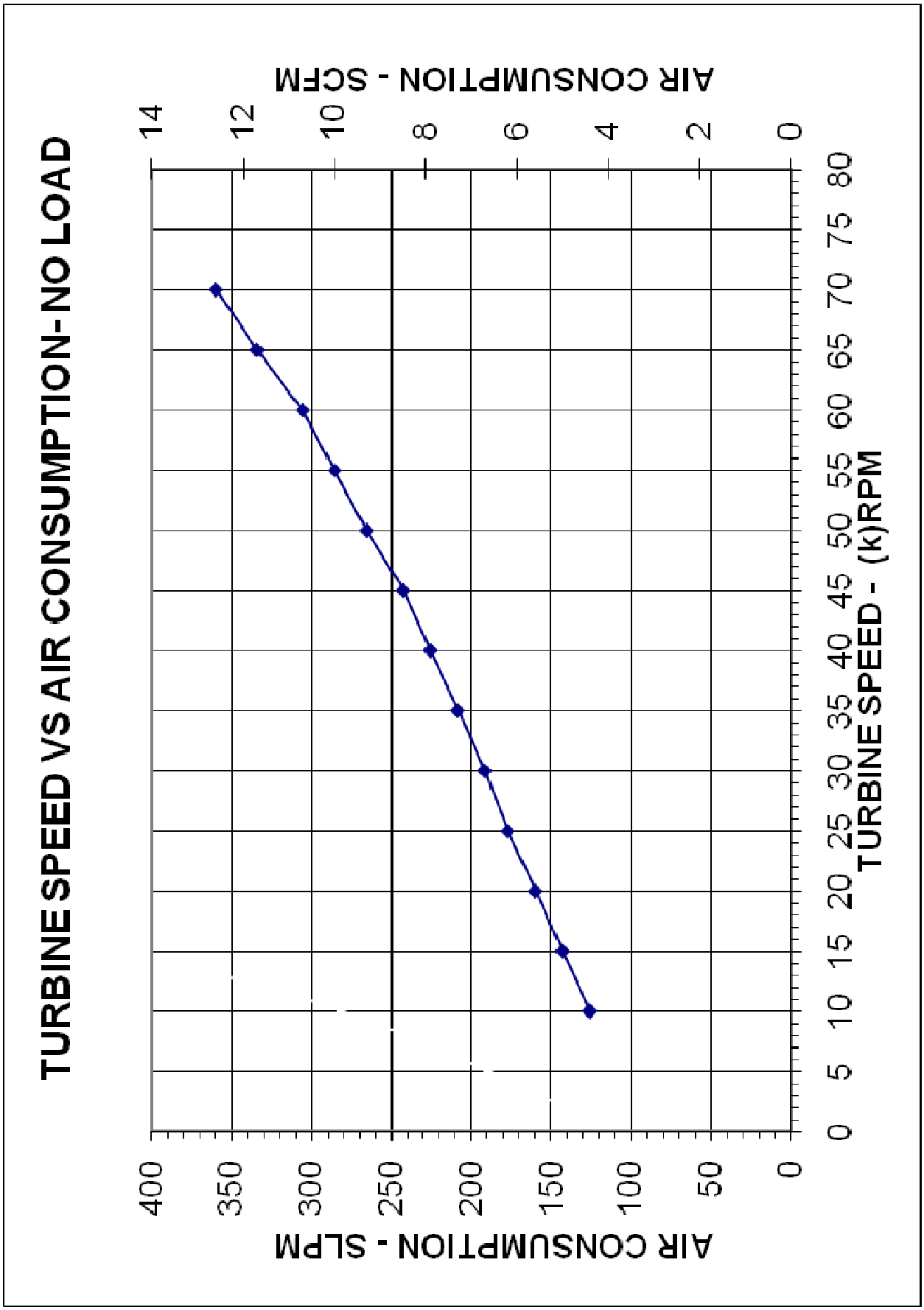


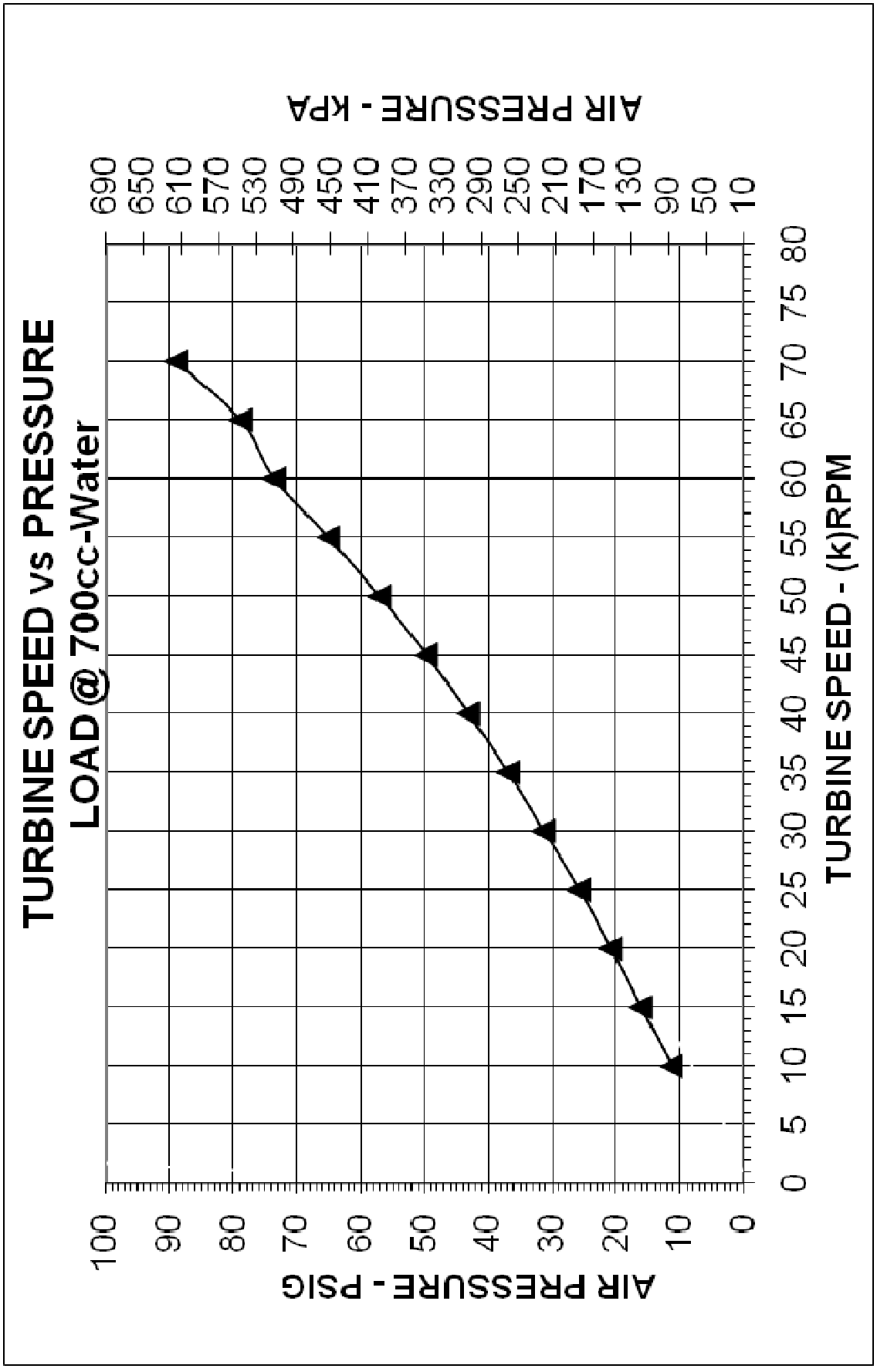

**High Voltage Serial Number**

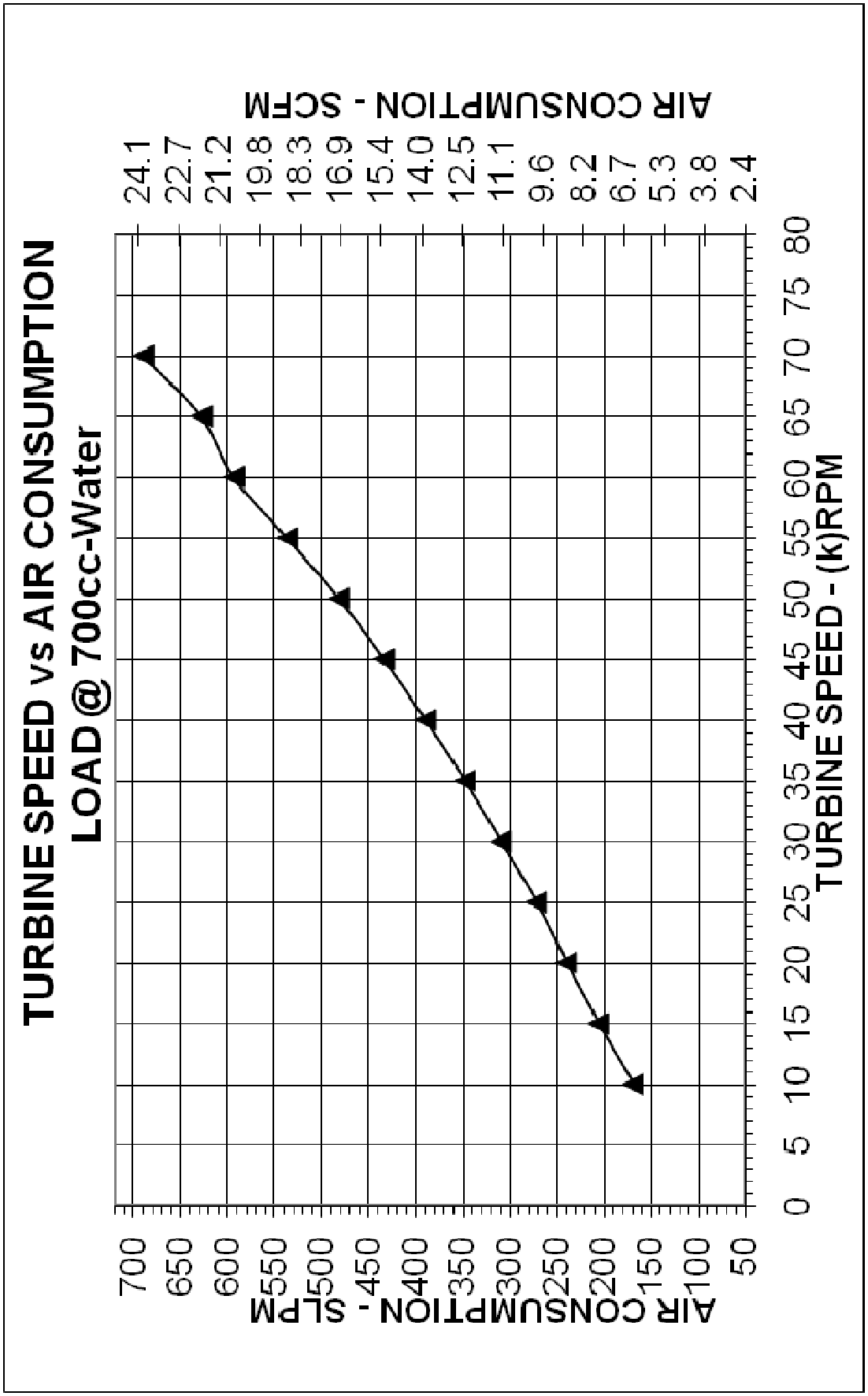
## GRAPHS

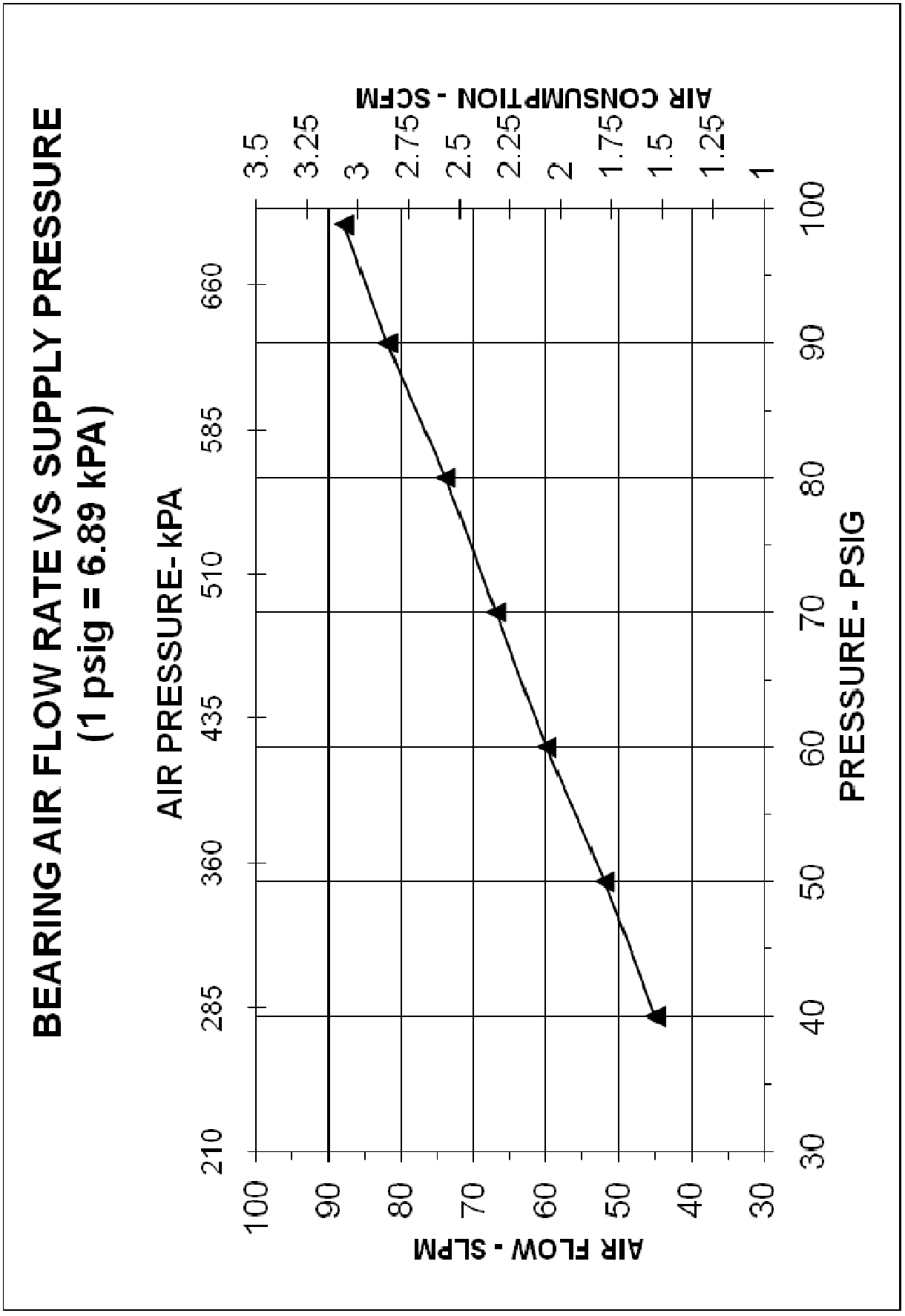
**NOTE - Graphical information provided for reference only.** Performance will vary depending on coating material viscosity and flow rate, supply tubing lengths, etc. (Pressure data shown was measured 12-inches (305mm) behind the applicator.)

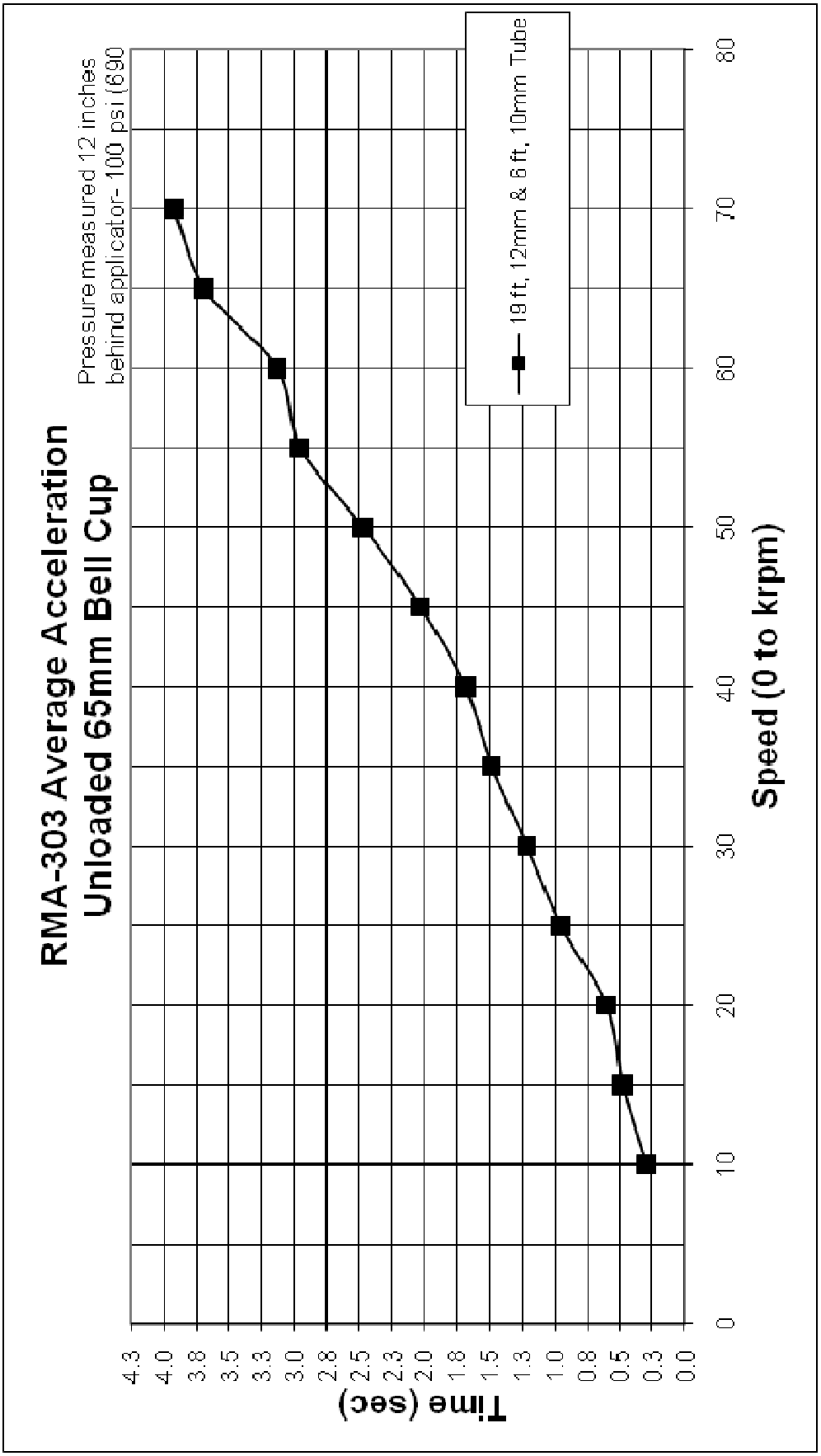


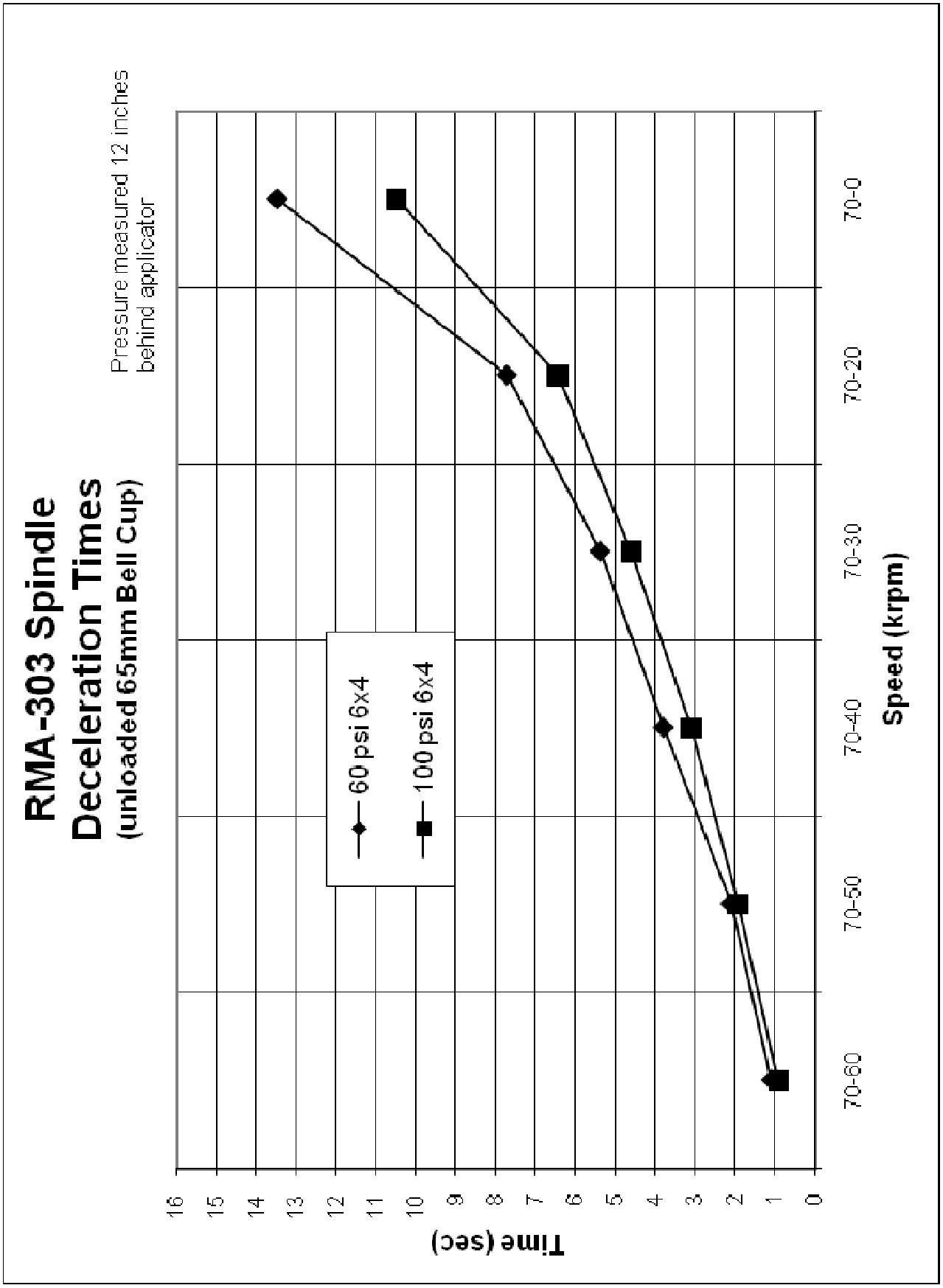

TURBINE SPEED VS AIR CONSUMPTION-NO LOAD
AIR CONSUMPTION - SCFM
14
12
10
8
6
4
2
0
AIR CONSUMPTION - SLPM
400
350
300
250
200
150
100
50
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
TURBINE SPEED - (K)RPM

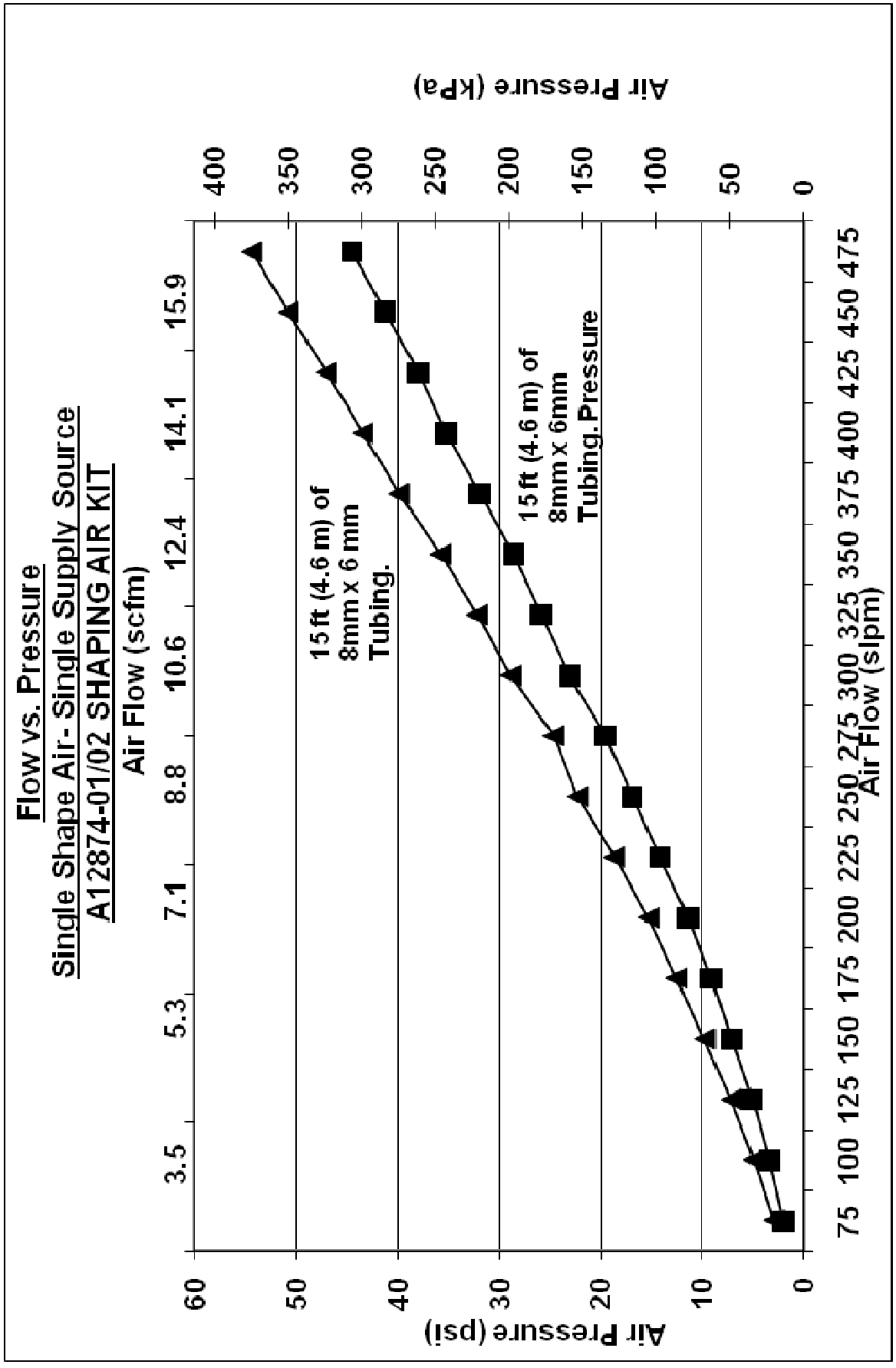

TURBINE SPEED vs PRESSURE
LOAD @ 700cc-Water
AIR PRESSURE - PSIG
AIR PRESSURE - kPA
TURBINE SPEED - (K)RPM
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
0 10 20 30 40 50 60 70 80 90 100
10 50 90 130 170 210 250 290 330 370 410 450 490 530 570 610 650 690

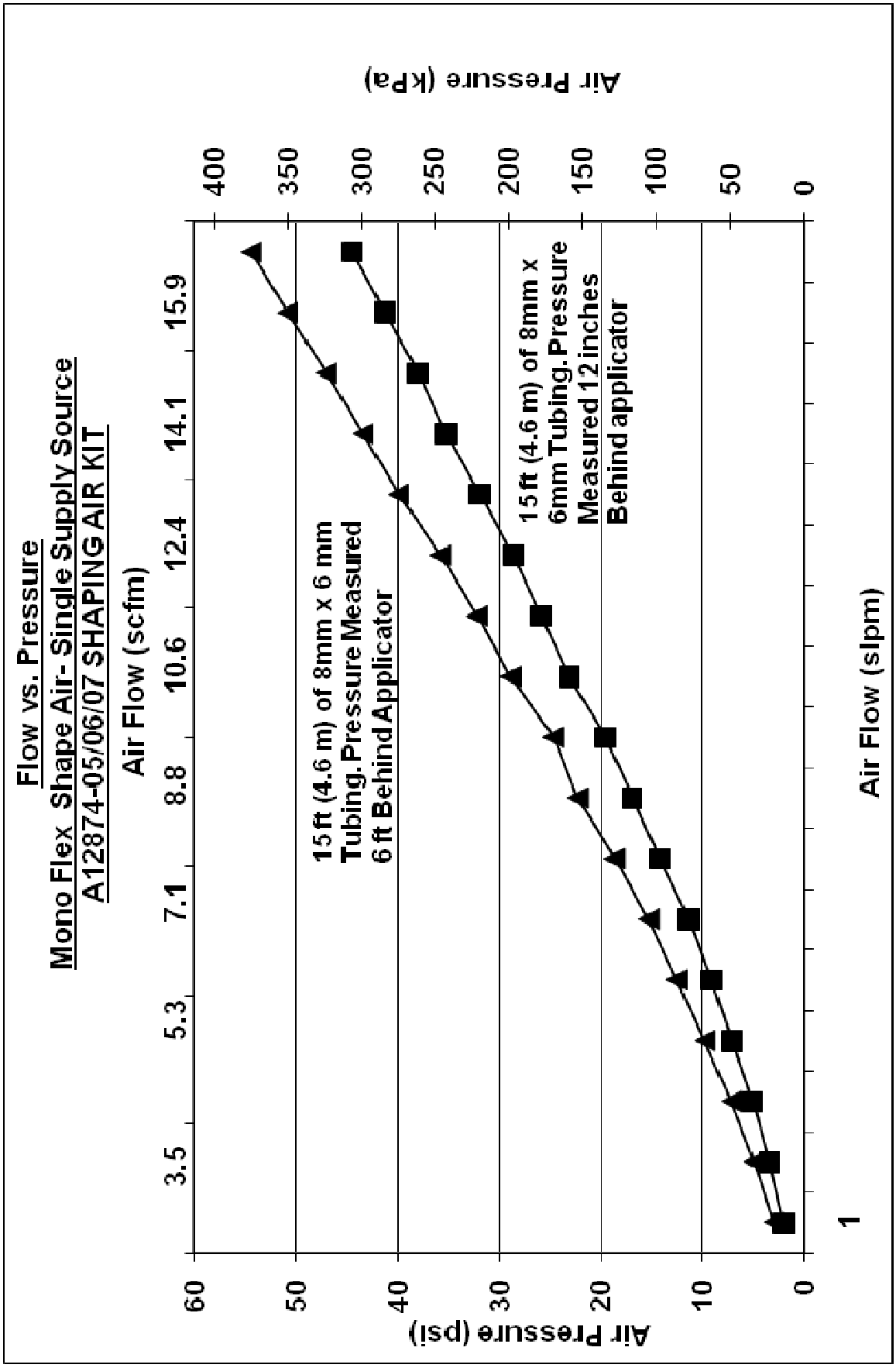

TURBINE SPEED vs AIR CONSUMPTION
LOAD @ 700cc-Water
AIR CONSUMPTION - SLPM
AIR CONSUMPTION - SCFM
TURBINE SPEED - (K)RPM
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
700 650 600 550 500 450 400 350 300 250 200 150 100 50
24.1 22.7 21.2 19.8 18.3 16.9 15.4 14.0 12.5 11.1 9.6 8.2 6.7 5.3 3.8 2.4

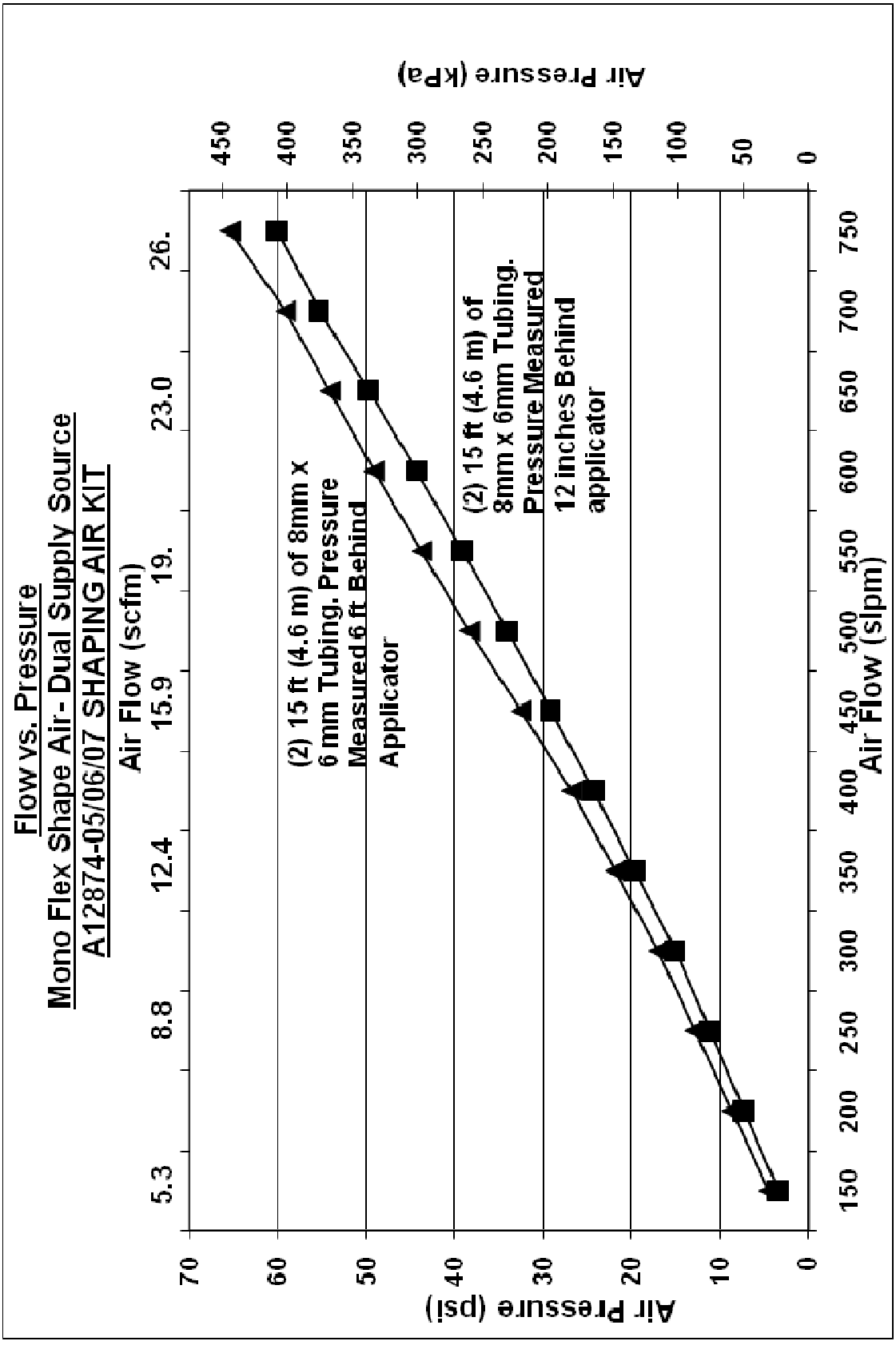

BEARING AIR FLOW RATE VS SUPPLY PRESSURE
(1 psig = 6.89 kPA)
AIR FLOW - SLPM
100
90
80
70
60
50
40
30
AIR PRESSURE- kPA
210
285
360
435
510
585
660
PRESSURE - PSIG
30
40
50
60
70
80
90
100
AIR CONSUMPTION - SCFM
3.5
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
1

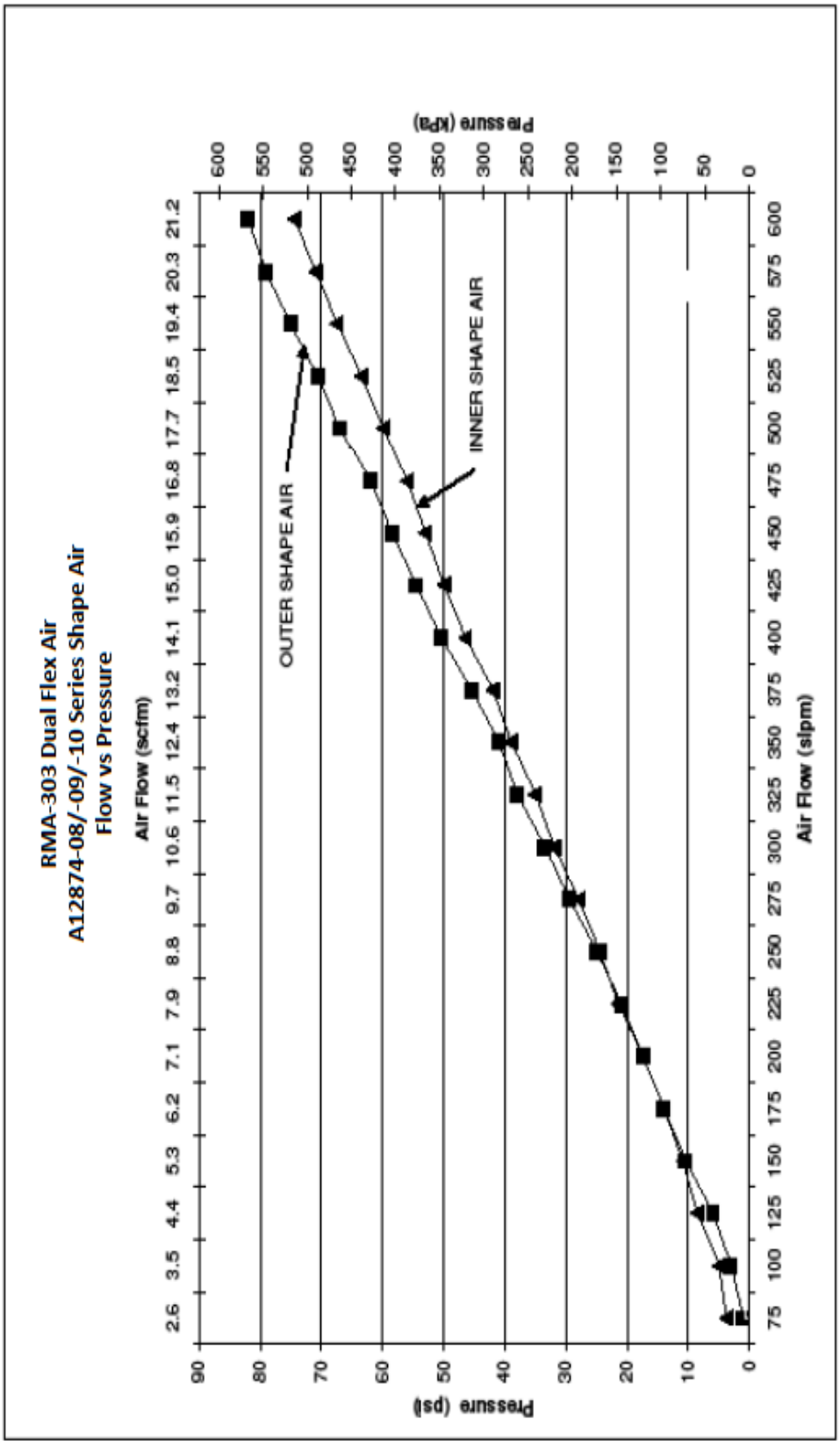

RMA-303 Average Acceleration
Unloaded 65mm Bell Cup
Pressure measured 12 inches behind applicator- 100 psi (690
19 ft, 12mm & 6 ft, 10mm Tube
Time (sec)
4.3
4.0
3.8
3.5
3.3
3.0
2.8
2.5
2.3
2.0
1.8
1.5
1.3
1.0
0.8
0.5
0.3
0.0
Speed (0 to krpm)
0
10
20
30
40
50
60
70
80

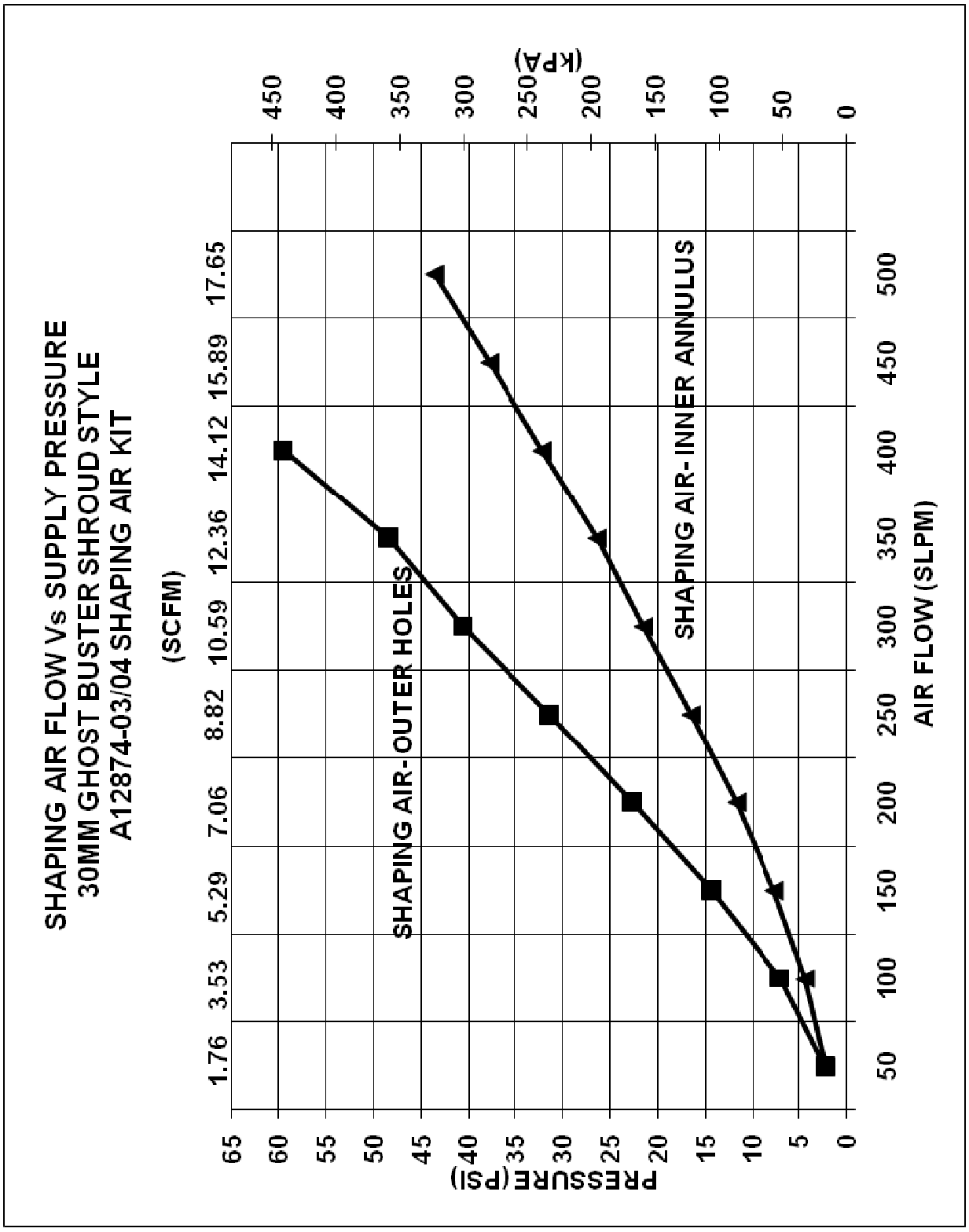

RMA-303 Spindle
Deceleration Times
(unloaded 65mm Bell Cup)
Pressure measured 12 inches
behind applicator
60 psi 6x4
100 psi 6x4
Time (sec)
Speed (krpm)
70-60
70-50
70-40
70-30
70-20
70-0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

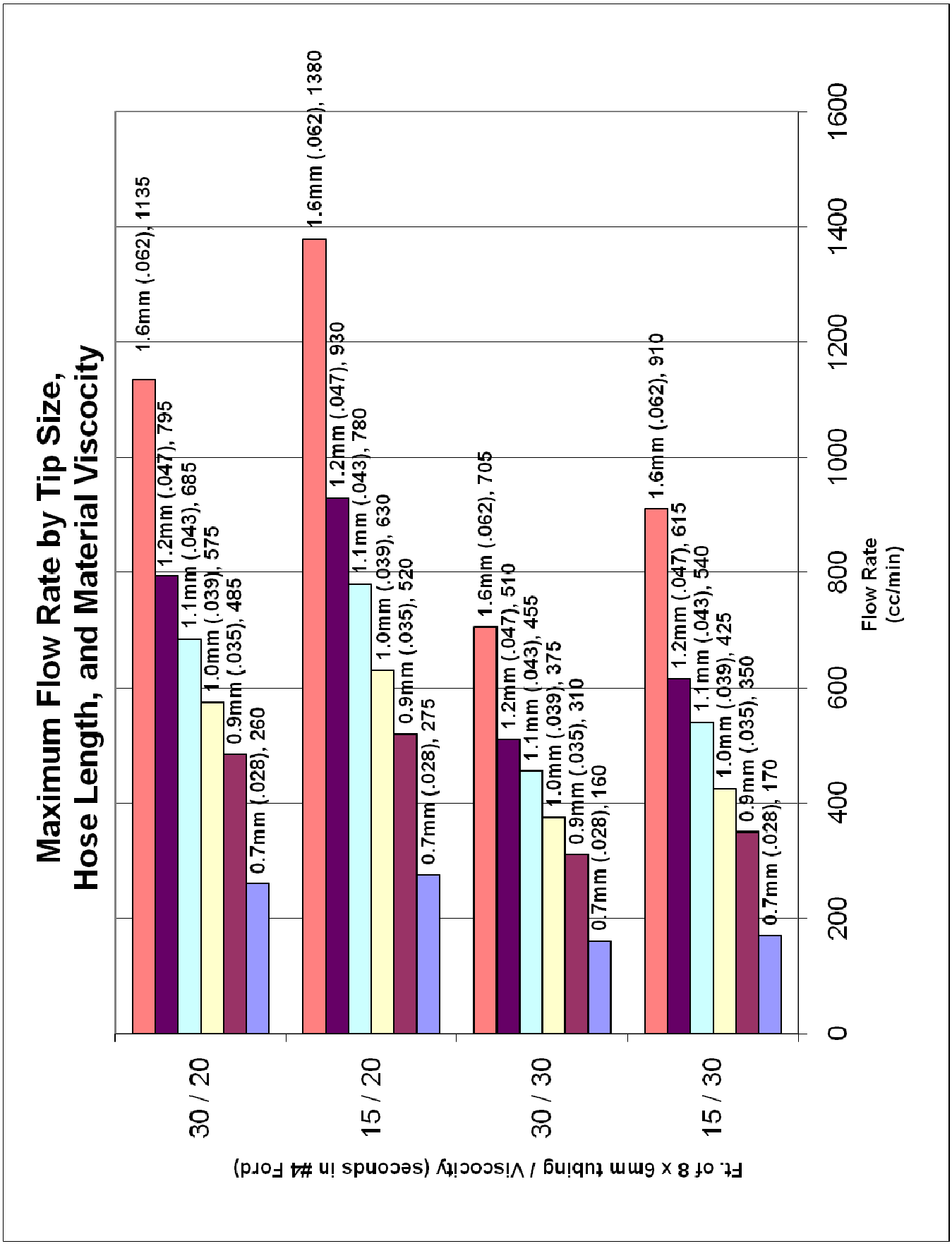

Flow vs. Pressure
Single Shape Air- Single Supply Source
A12874-01/02 SHAPING AIR KIT
Air Flow (scfm)
3.5 5.3 7.1 8.8 10.6 12.4 14.1 15.9
Air Pressure (psi)
0 10 20 30 40 50 60
Air Pressure (kPa)
0 50 100 150 200 250 300 350 400
75 100 125 150 175 200 225 250 275 300 325 350 375 400 425 450 475
Air Flow (slpm)
15 ft (4.6 m) of 8mm x 6 mm Tubing.
15 ft (4.6 m) of 8mm x 6mm Tubing.Pressure


Flow vs. Pressure
Mono Flex Shape Air- Single Supply Source
A12874-05/06/07 SHAPING AIR KIT
Air Flow (scfm)
3.5
5.3
7.1
8.8
10.6
12.4
14.1
15.9
Air Pressure (psi)
0
10
20
30
40
50
60
Air Pressure (kPa)
0
50
100
150
200
250
300
350
400
15 ft (4.6 m) of 8mm x 6 mm Tubing. Pressure Measured 6 ft Behind Applicator
15 ft (4.6 m) of 8mm x 6mm Tubing. Pressure Measured 12 inches Behind applicator
1
Air Flow (slpm)

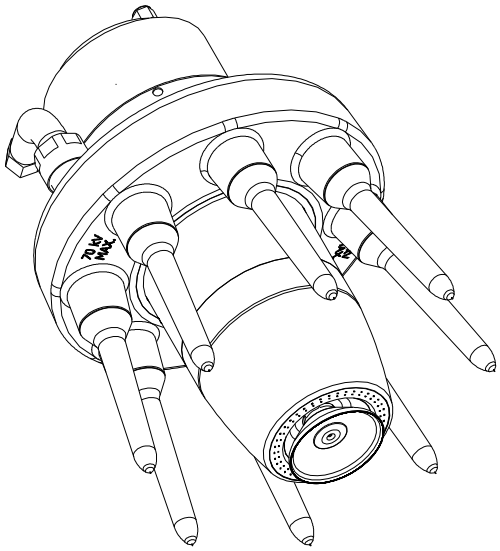

Flow vs. Pressure
Mono Flex Shape Air- Dual Supply Source
A12874-05/06/07 SHAPING AIR KIT
Air Flow (scfm)
5.3
8.8
12.4
15.9
19.
23.0
26.
Air Pressure (psi)
0
10
20
30
40
50
60
70
Air Flow (slpm)
150
200
250
300
350
400
450
500
550
600
650
700
750
Air Pressure (kPa)
0
50
100
150
200
250
300
350
400
450
(2) 15 ft (4.6 m) of 8mm x 6 mm Tubing. Pressure Measured 6 ft Behind Applicator
(2) 15 ft (4.6 m) of 8mm x 6mm Tubing. Pressure Measured 12 inches Behind applicator

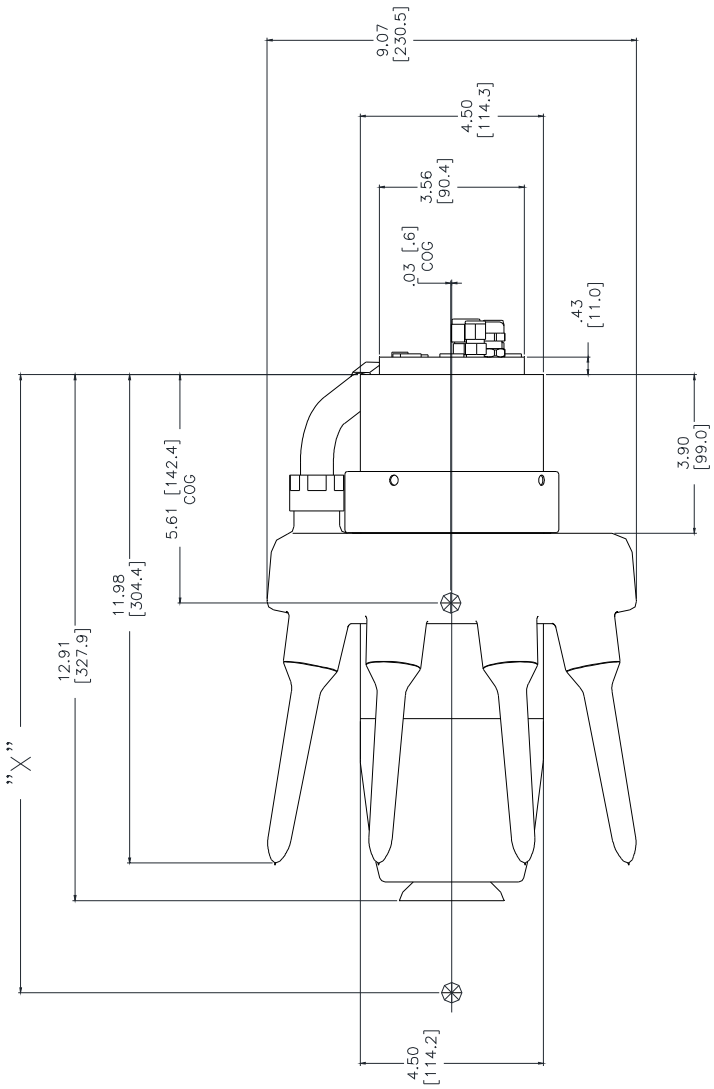

RMA-303 Dual Flex Air
A12874-08/-09/-10 Series Shape Air
Flow vs Pressure
OUTER SHAPE AIR
INNER SHAPE AIR
Pressure (psi)
Pressure (kPa)
Air Flow (scfm)
Air Flow (slpm)
90 80 70 60 50 40 30 20 10 0
600 550 500 450 400 350 300 250 200 150 100 50 0
2.6 3.5 4.4 5.3 6.2 7.1 7.9 8.8 9.7 10.6 11.5 12.4 13.2 14.1 15.0 15.9 16.8 17.7 18.5 19.4 20.3 21.2
75 100 125 150 175 200 225 250 275 300 325 350 375 400 425 450 475 500 525 550 575 600


SHAPING AIR FLOW Vs SUPPLY PRESSURE
30MM GHOST BUSTER SHROUD STYLE
A12874-03/04 SHAPING AIR KIT
(SCFM)
1.76
3.53
5.29
7.06
8.82
10.59
12.36
14.12
15.89
17.65
(KPA)
450
400
350
300
250
200
150
100
50
0
PRESSURE (PSI)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
SHAPING AIR- OUTER HOLES
SHAPING AIR- INNER ANNULUS
50
100
150
200
250
300
350
400
450
500
AIR FLOW (SLPM)


Maximum Flow Rate by Tip Size,
Hose Length, and Material Viscocity
Ft. of 8 x 6mm tubing / Viscocity (seconds in #4 Ford)
30 / 20
15 / 20
30 / 30
15 / 30
0
200
400
600
800
1000
1200
1400
1600
Flow Rate
(cc/min)
1.6mm (.062), 1135
1.2mm (.047), 795
1.1mm (.043), 685
1.0mm (.039), 575
0.9mm (.035), 485
0.7mm (.028), 260
1.6mm (.062), 1380
1.2mm (.047), 930
1.1mm (.043), 780
1.0mm (.039), 630
0.9mm (.035), 520
0.7mm (.028), 275
1.6mm (.062), 705
1.2mm (.047), 510
1.1mm (.043), 455
1.0mm (.039), 375
0.9mm (.035), 310
0.7mm (.028), 160
1.6mm (.062), 910
1.2mm (.047), 615
1.1mm (.043), 540
1.0mm (.039), 425
0.9mm (.035), 350
0.7mm (.028), 170

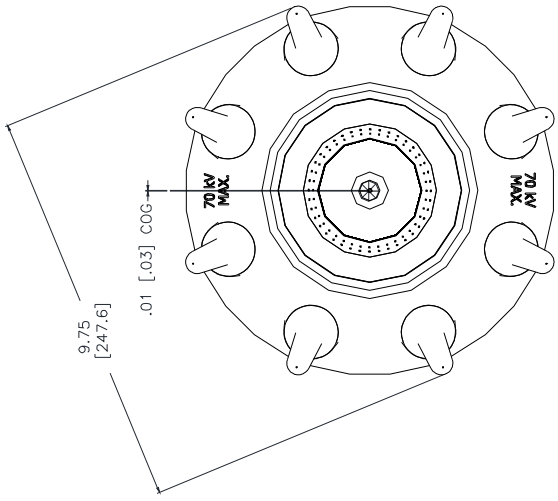
## MMA-303 TOOL CENTER POINT DIMENSIONS (65mm Dual Flex)



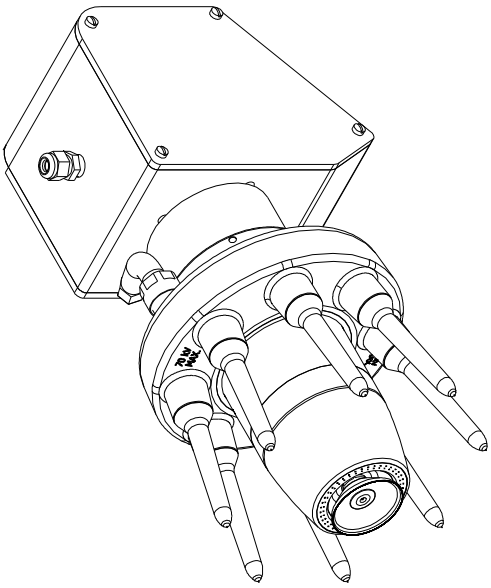



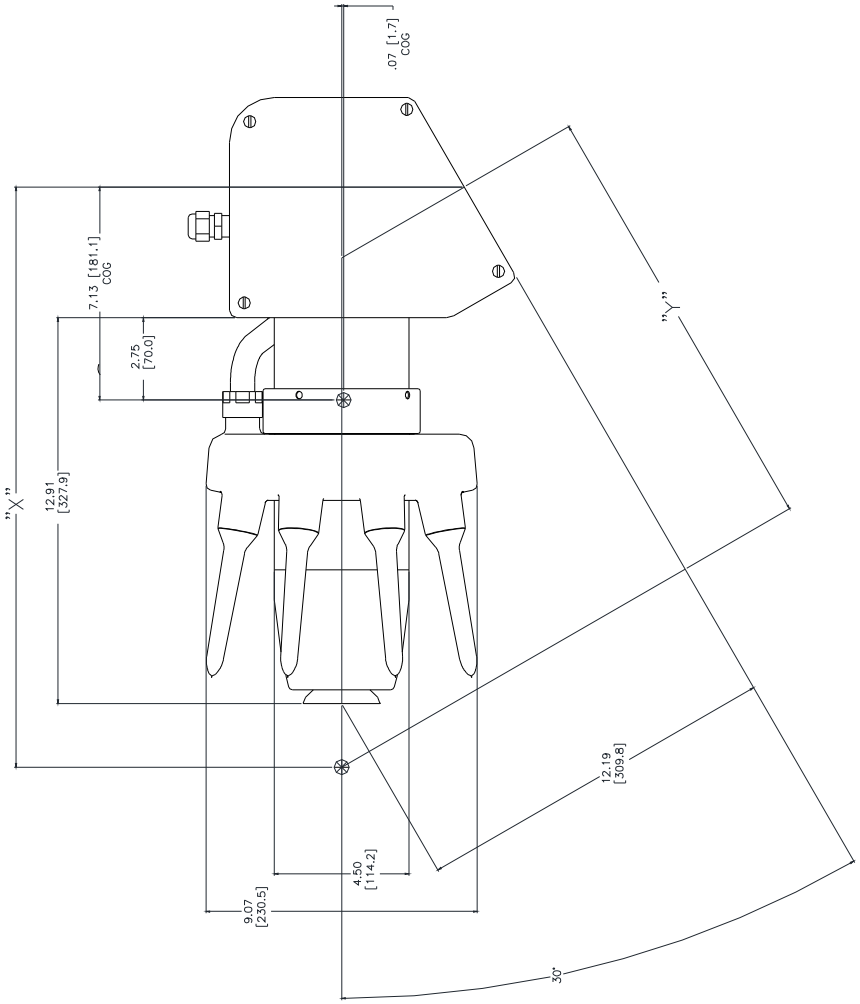

| 65MM MMA-303 INDIRECT TOOL POINT DIMENSIONS (DUAL FLEX) | |
|---|---|
| TD | X |
| 6-inches (152mm) | 18.91-inches (480.3mm) |
| 8-inches (203mm) | 20.91-inches (531.1mm) |
| 10-inches (254mm) | 22.91-inches (581.9mm) |
| 12-inches (305mm) | 24.91-inches (632.7mm) |

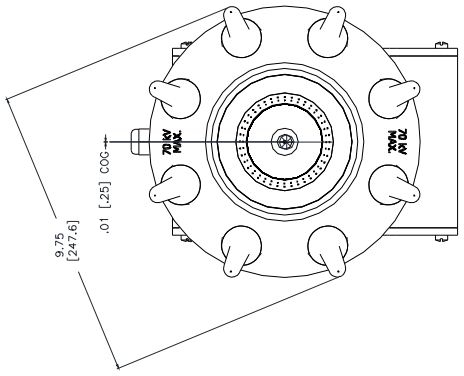
**Weight: 12.12 lbs. (5.5 Kg)**



# MMA-303 TOOL CENTER POINT DIMENSIONS (65mm Dual Flex W/Adapter)



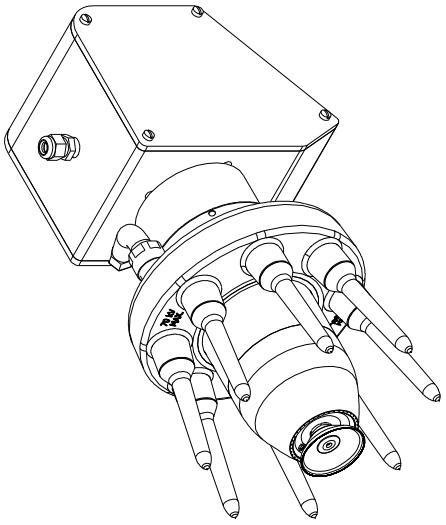


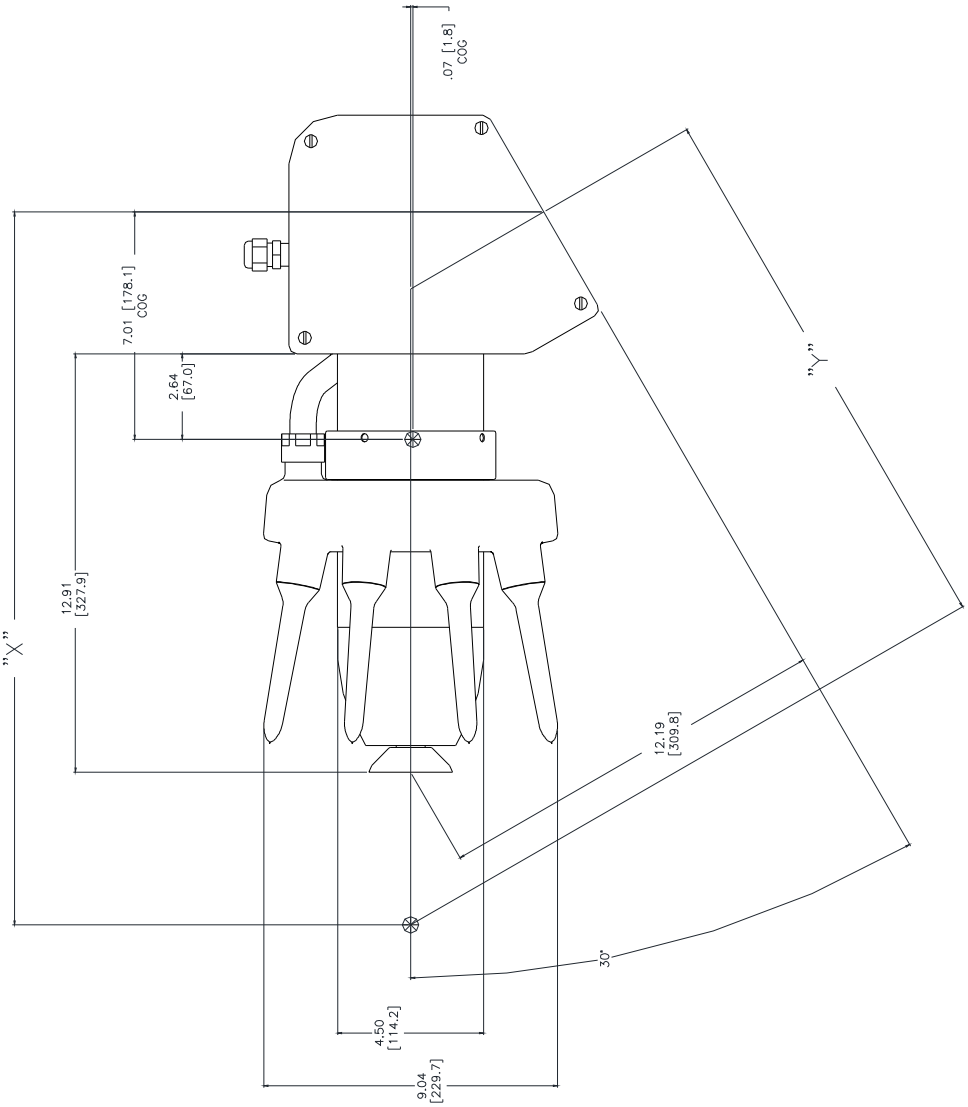




| 65MM MMA-303 INDIRECT TOOL POINT DIMENSIONS (DUAL FLEX W/ADAPTER) | | |
|---|---|---|
| TD | X | y |
| 6-inches (152mm) | 23.28-inches (591.4mm) | 18.08-inches (459.3mm) |
| 8-inches (203mm) | 25.28-inches (642.2mm) | 19.81-inches (503.3mm) |
| 10-Inches (254mm) | 27.28-inches (693.0mm) | 21.55-inches (547.3mm) |
| 12-inches (305mm) | 29.28-inches (743.8mm) | 23.28-inches (591.3mm) |

**Weight: 20.7 lbs. (9.4 Kg)**

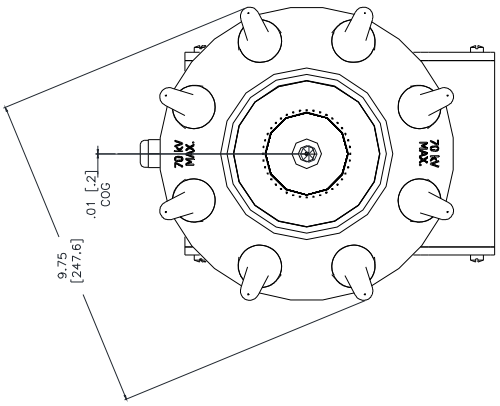
## MMA-303 TOOL CENTER POINT DIMENSIONS (65mm Mono Flex W/ Adapter)



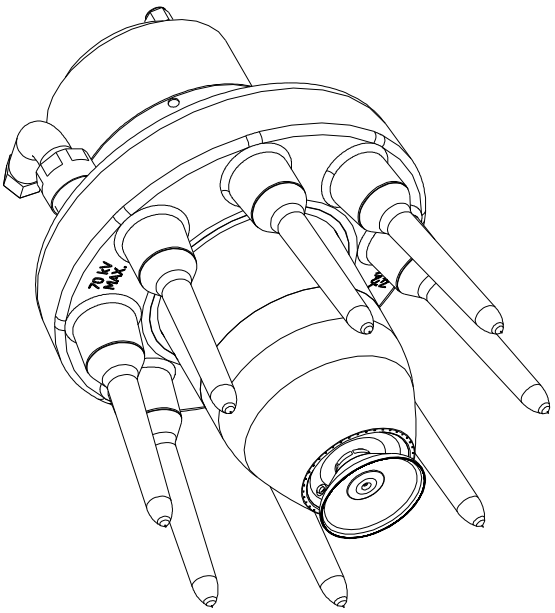


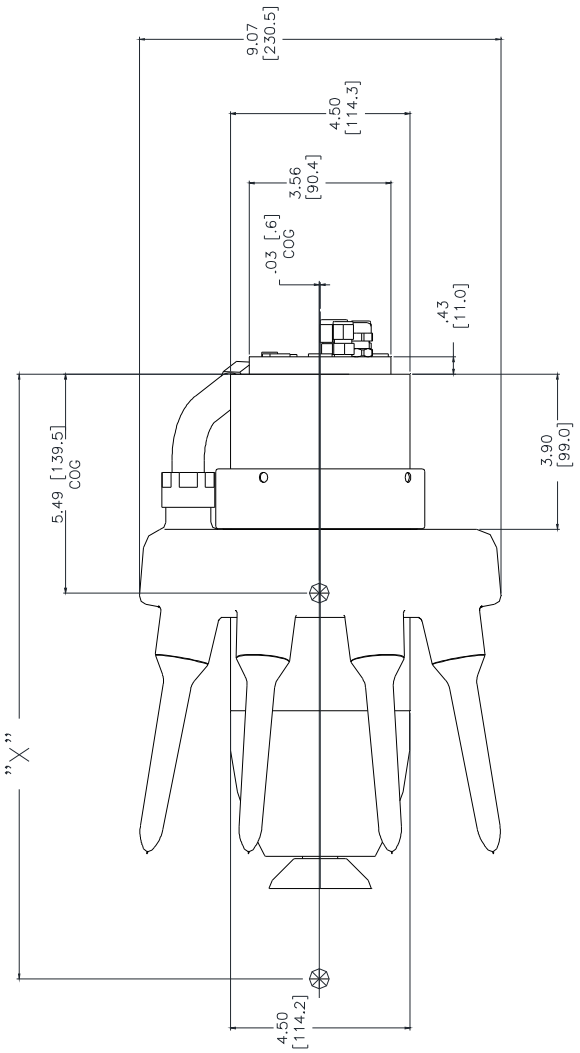

| 65MM MMA-303 INDIRECT TOOL POINT DIMENSIONS (MONO FLEX W/ ADAPTER) | | |
|---|---|---|
| TD | X | Y |
| 6-inches (152mm) | 23.28-inches (591.4mm) | 18.08-inches (459.3mm) |
| 8-inches (203mm) | 25.28-inches (642.2mm) | 19.81-inches (503.3mm) |
| 10-Inches (254mm) | 27.28-inches (693.0mm) | 21.55-inches (547.3mm) |
| 12-inches (305mm) | 29.28-inches (743.8mm) | 23.28-inches (591.3mm) |

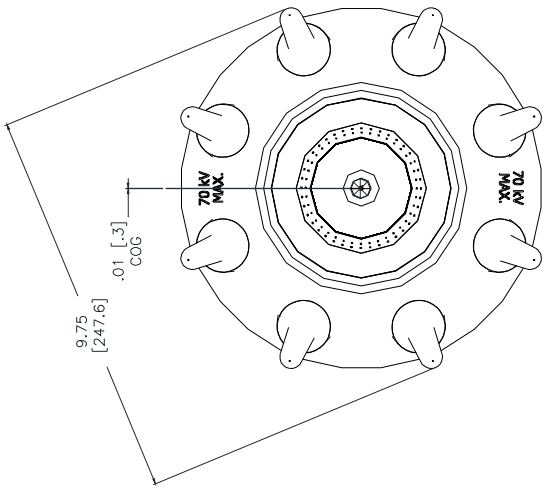
**Weight: 20.43 lbs. (9.3 Kg)**



## MMA-303 TOOL CENTER POINT DIMENSIONS (65mm Mono Flex)



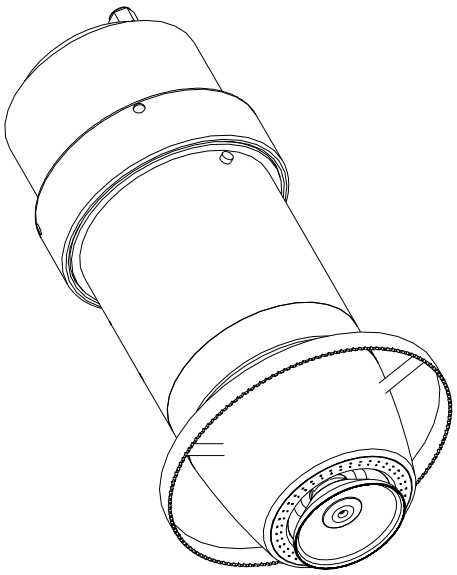



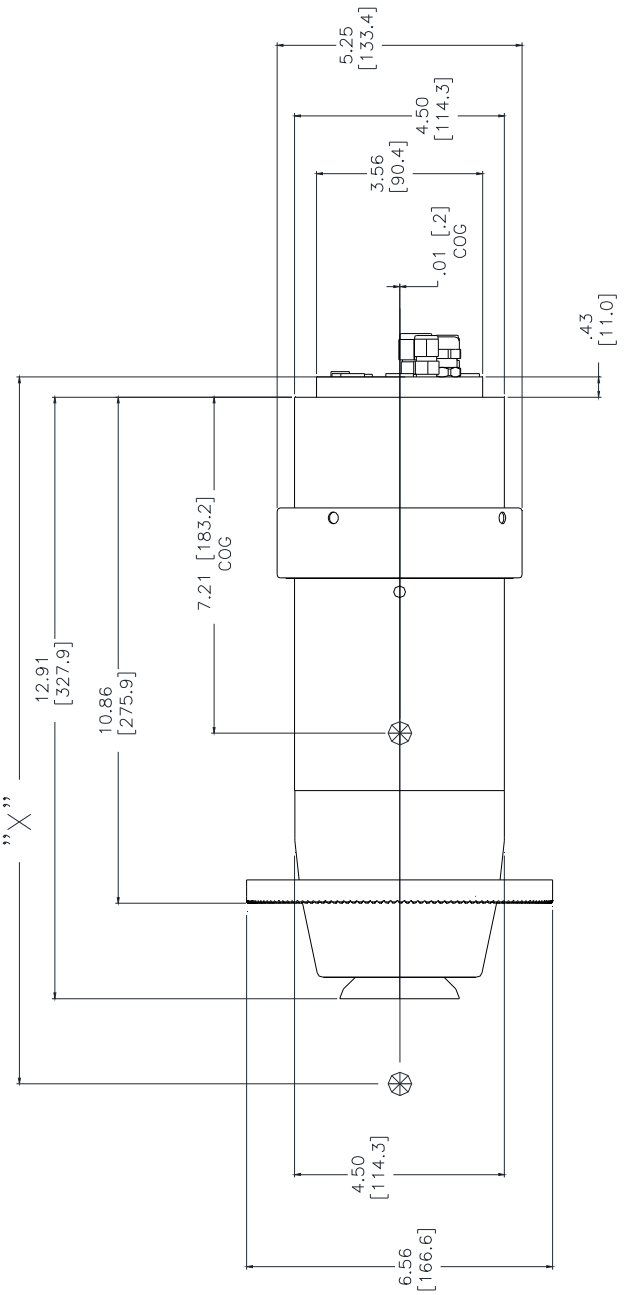



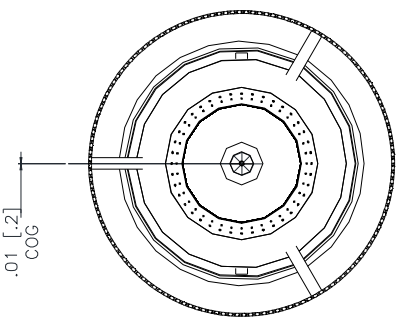

| 65MM MMA-303 INDIRECT TOOL POINT DIMENSIONS (MONO FLEX) | |
|---|---|
| TD | X |
| 6-inches (152mm) | 18.91-inches (480.3mm) |
| 8-inches (203mm) | 20.91-inches (531.1mm) |
| 10-inches (254mm) | 22.91-inches (581.9mm) |
| 12-inches (305mm) | 24.91-inches (632.7mm) |

**Weight: 13.97 lbs. (6.3 Kg)**

## MMA-303 TOOL CENTER POINT DIMENSIONS (65mm Dual Flex)



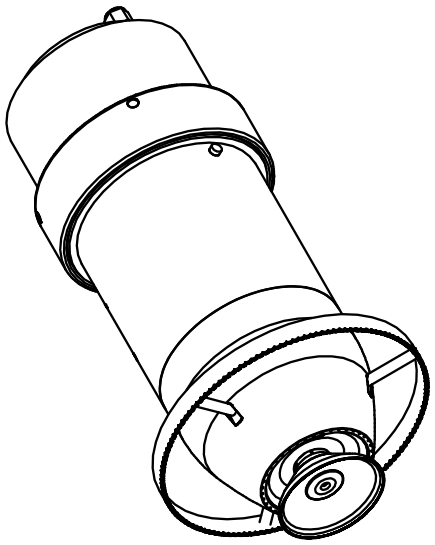


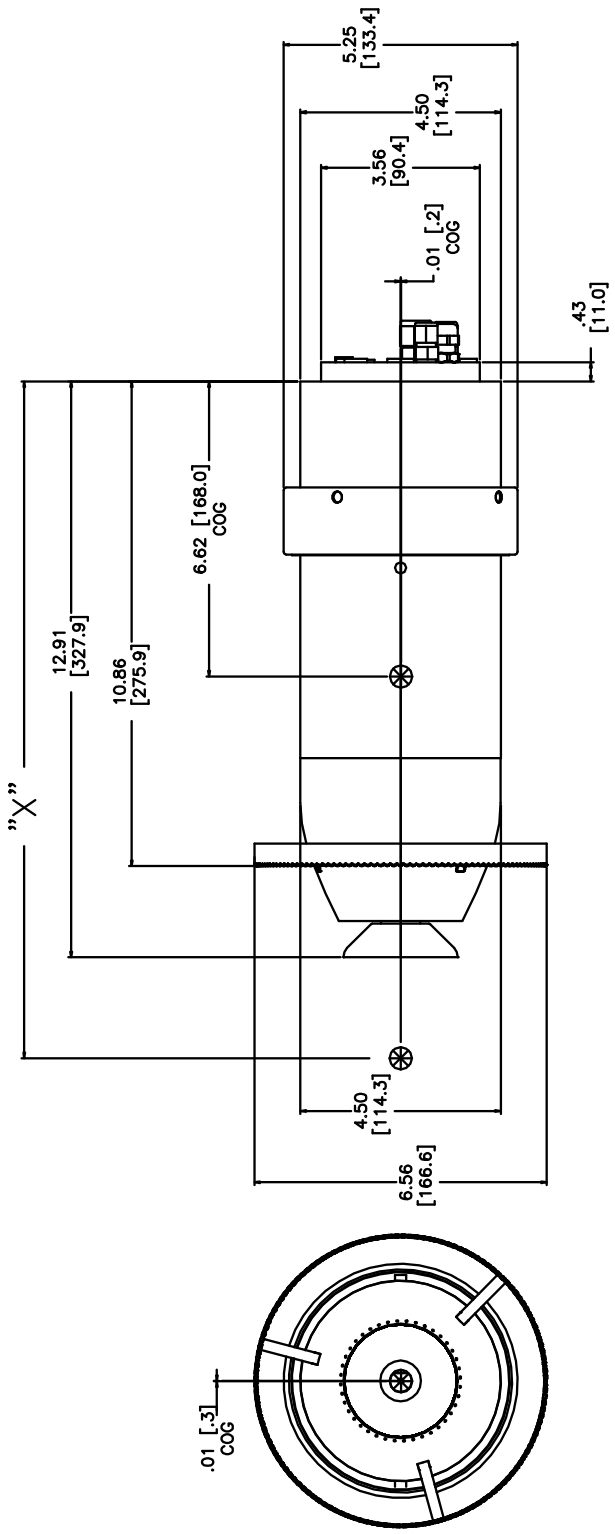




| 65MM MMA-303 DIRECT TOOL POINT DIMENSIONS (DUAL FLEX) | |
|---|---|
| TD | X |
| 6-inches (152mm) | 18.91-inches (480.3mm) |
| 8-inches (203mm) | 20.91-inches (531.1mm) |
| 10-inches (254mm) | 22.91-inches (581.9mm) |
| 12-inches (305mm) | 24.91-inches (632.7mm) |

**Weight: 11.28 lbs. (5.1 Kg)**

## MMA-303 TOOL POINT CENTER DIMENSIONS (65mm Mono Flex)

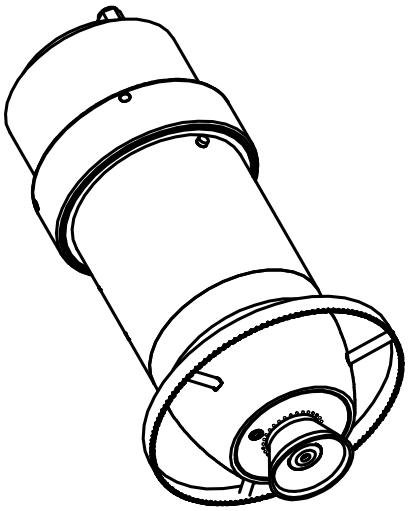


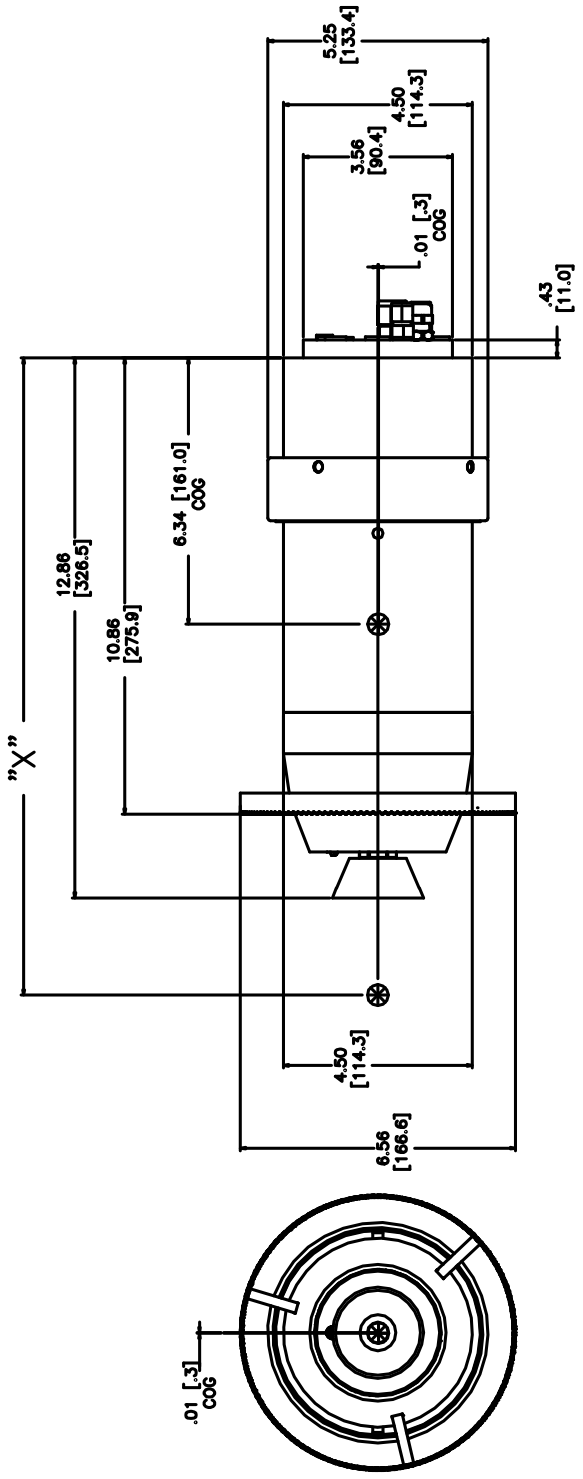



| 65MM MMA-303 DIRECT TOOL POINT DIMENSIONS (MONO FLEX) | |
|---|---|
| TD | X |
| 6-inches (152mm) | 18.91-inches (480.3mm) |
| 8-inches (203mm) | 20.91-inches (531.1mm) |
| 10-inches (254mm) | 22.91-inches (581.9mm) |
| 12-inches (305mm) | 24.91-inches (632.7mm) |

**Weight: 10.28 lbs. (4.5 Kg)**

## MMA-303 TOOL CENTER POINT DIMENSIONS (55mm)

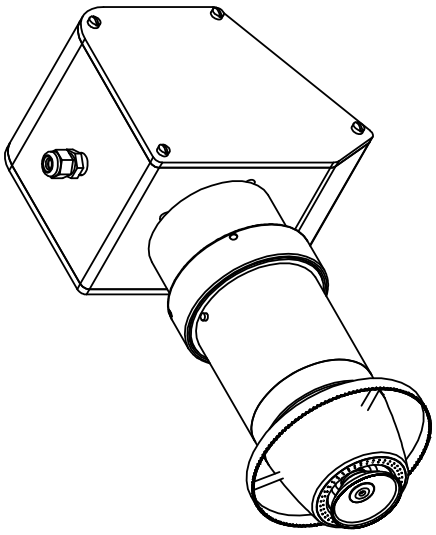


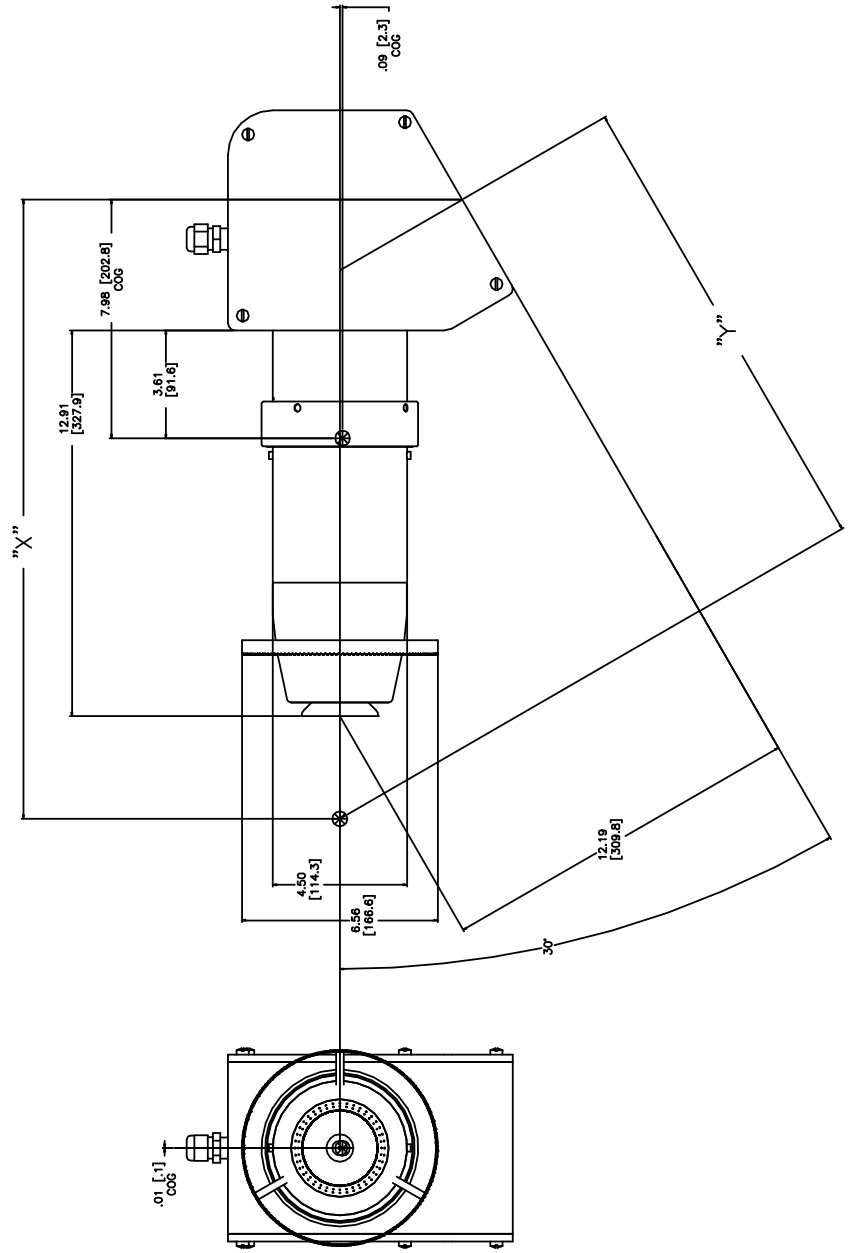



| 55MM MMA-303 DIRECT TOOL POINT DIMENSIONS | |
|---|---|
| TD | X |
| 6-inches (152mm) | 18.861inches (478.9mm) |
| 8-inches (203mm) | 20.86-inches (529.7mm) |
| 10-inches (254mm) | 22.86-inches (580.5mm) |
| 12-inches (305mm) | 24.86-inches (631.3mm) |

**Weight: 9.45 lbs. (4.3 Kg)**

## MMA-303 TOOL CENTER POINT DIMENSIONS (65mm Dual Flex W/Adapter)

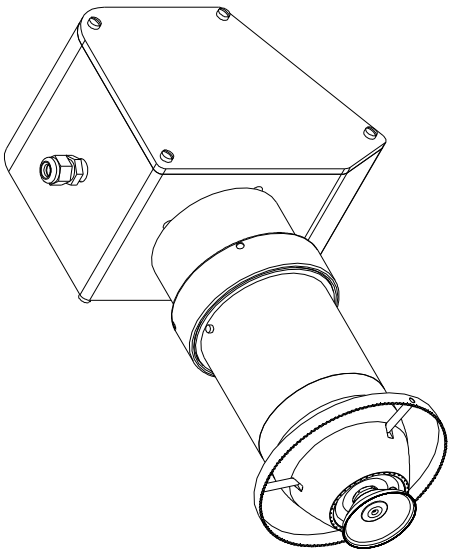


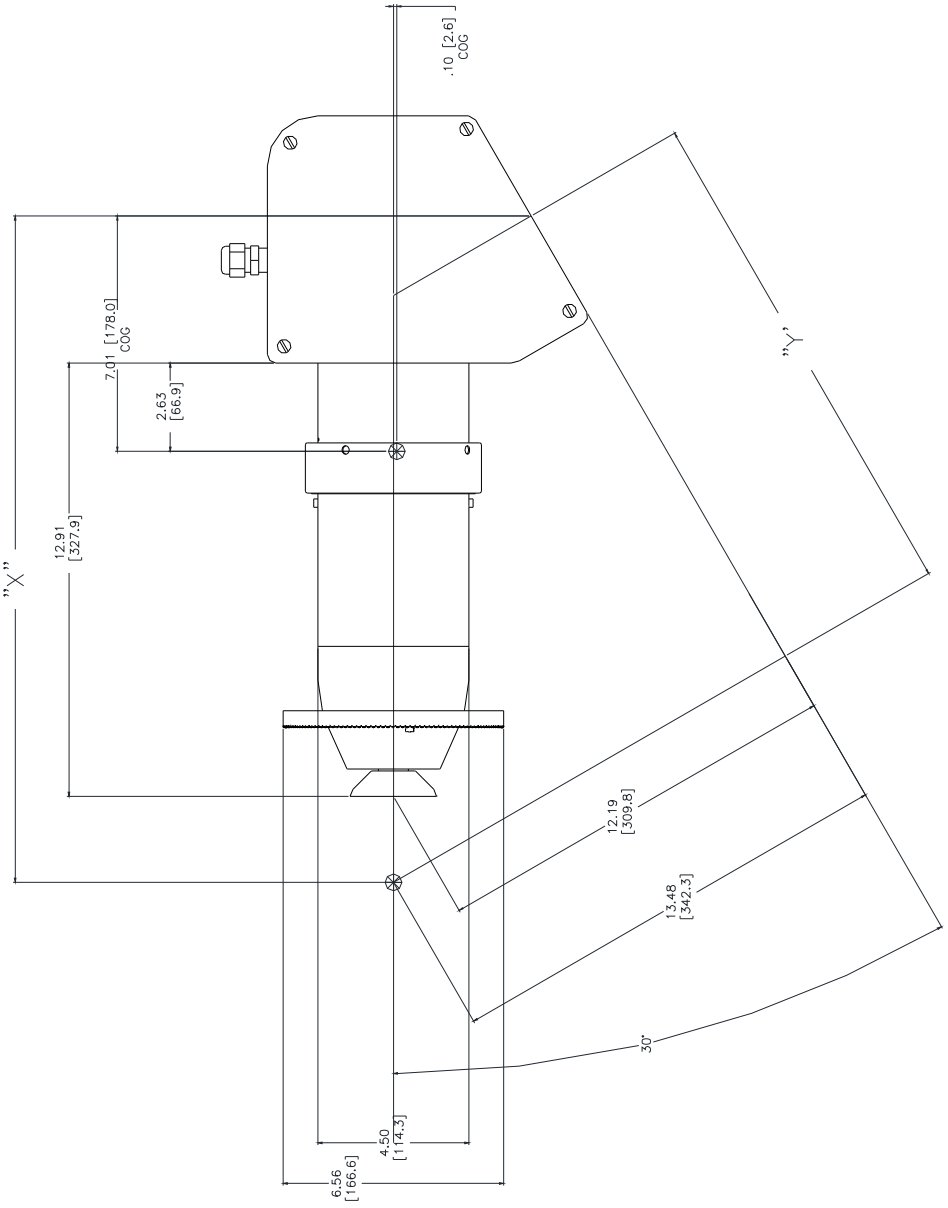


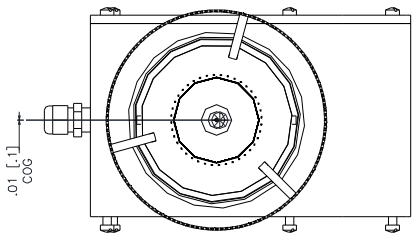

| 65MM MMA-303 DIRECT TOOL POINT DIMENSIONS (DUAL FLEX W/ADAPTER) | | |
|---|---|---|
| TD | X | y |
| 6-inches (152mm) | 23.28-inches (591.4mm) | 18.08-inches (459.3mm) |
| 8-inches (203mm) | 25.28-inches (642.2mm) | 19.81-inches (503.3mm) |
| 10-Inches (254mm) | 27.28-inches (693.0mm) | 21.55-inches (547.3mm) |
| 12-inches (305mm) | 29.28-inches (743.8mm) | 23.28-inches (591.3mm) |

**Weight: 18.49 lbs. (8.4 Kg)**

## MMA-303 TOOL CENTER POINT DIMENSIONS (65mm Mono Flex W/Adapter)



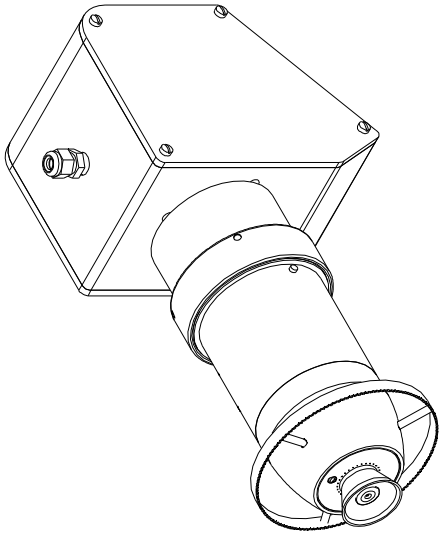


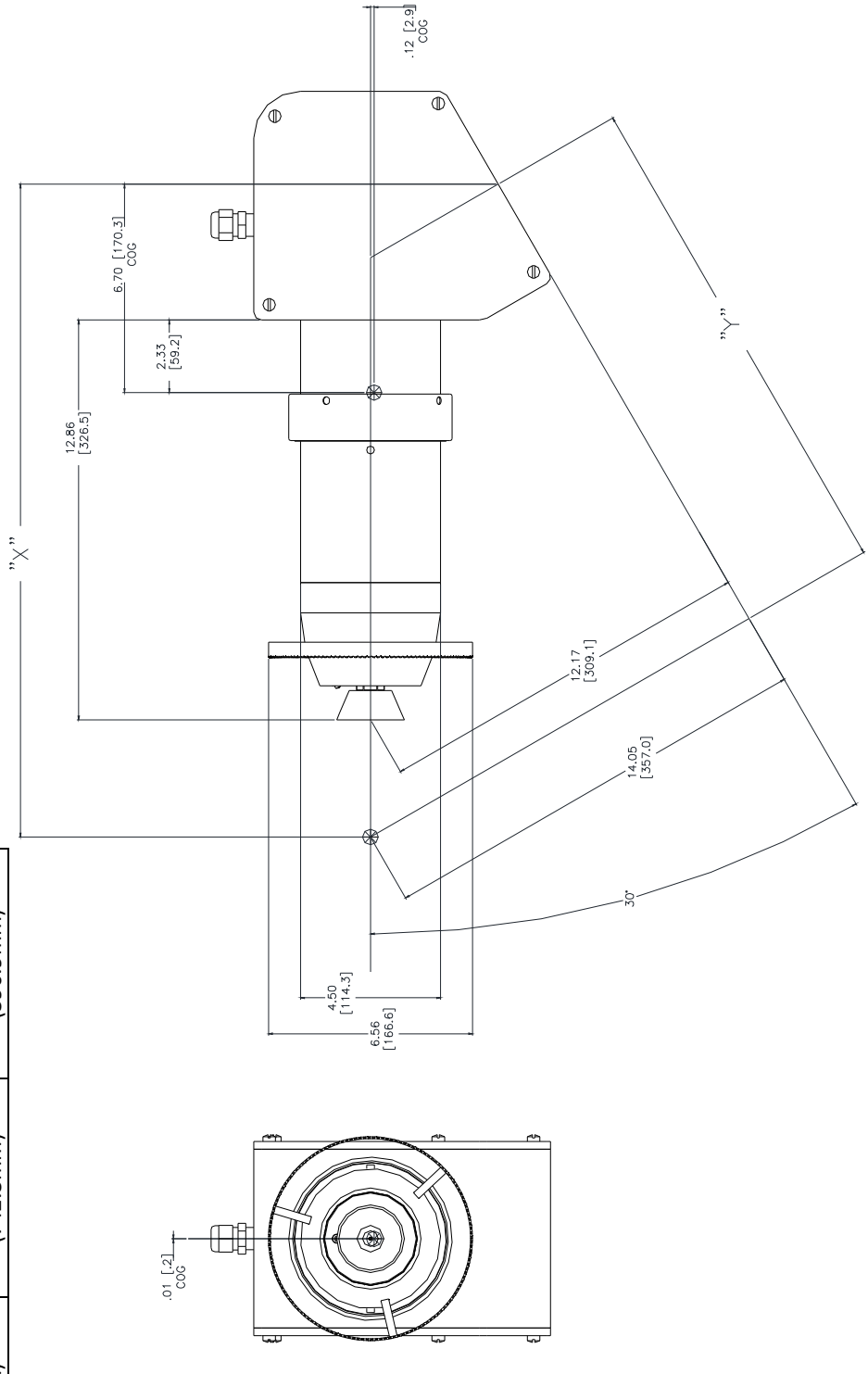




| 65MM MMA-303 DIRECT TOOL POINT DIMENSIONS (MONO FLEX W/ADAPTER) | | |
|---|---|---|
| TD | X | y |
| 6-inches (152mm) | 23.28-inches (591.4mm) | 18.08-inches (459.3mm) |
| 8-inches (203mm) | 25.28-inches (642.2mm) | 19.81-inches (503.3mm) |
| 10-Inches (254mm) | 27.28-inches (693.0mm) | 21.55-inches (547.3mm) |
| 12-inches (305mm) | 29.28-inches (743.8mm) | 23.28-inches (591.3mm) |

**Weight: 16.46 lbs. (7.5 Kg)**

## MMA-303 TOOL CENTER POINT DIMENSIONS (55mm W/Adapter)





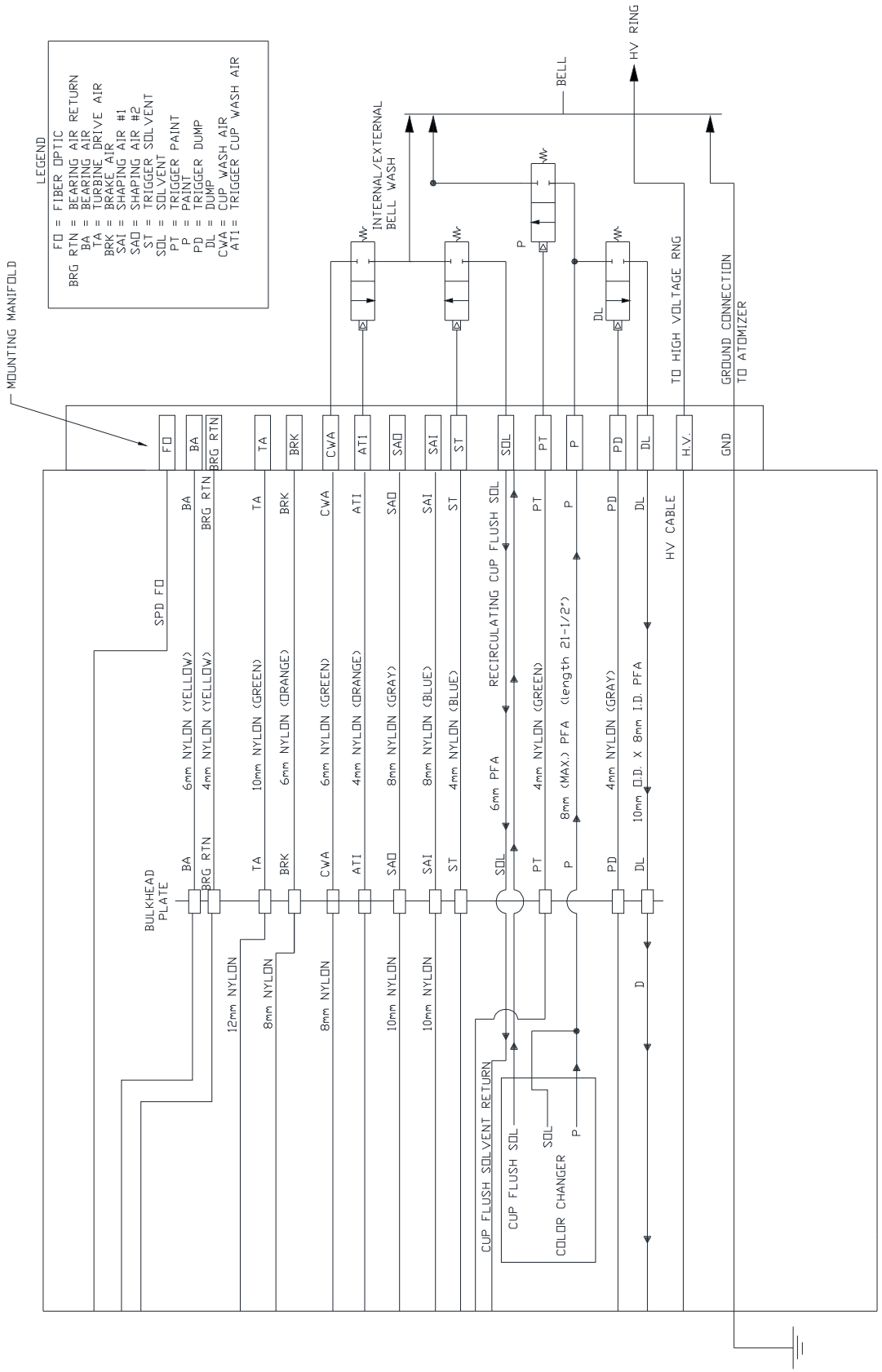




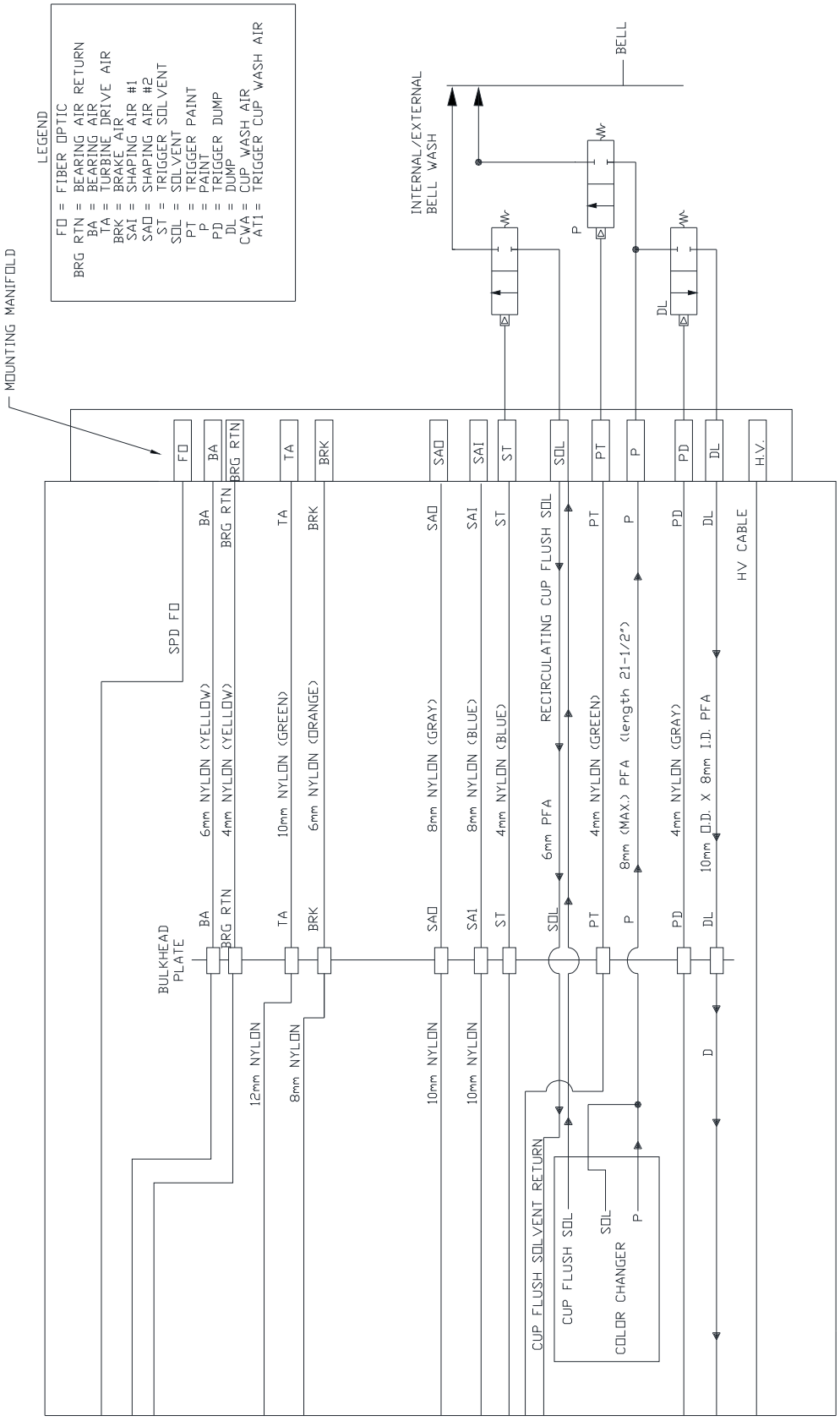
| 55MM MMA-303 DIRECT TOOL POINT DIMENSIONS (W/ ADAPTER) | | |
|---|---|---|
| TD | X | y |
| 6-inches (152mm) | 23.23-inches (590.1mm) | 18.07-inches (458.9mm) |
| 8-inches (203mm) | 25.23-inches (640.9mm) | 19.80-inches (502.9mm) |
| 10-Inches (254mm) | 27.23-inches (691.7mm) | 21.53-inches (546.9mm) |
| 12-inches (305mm) | 29.23-inches (742.5mm) | 23.26-inches (590.9mm) |

**Weight:**

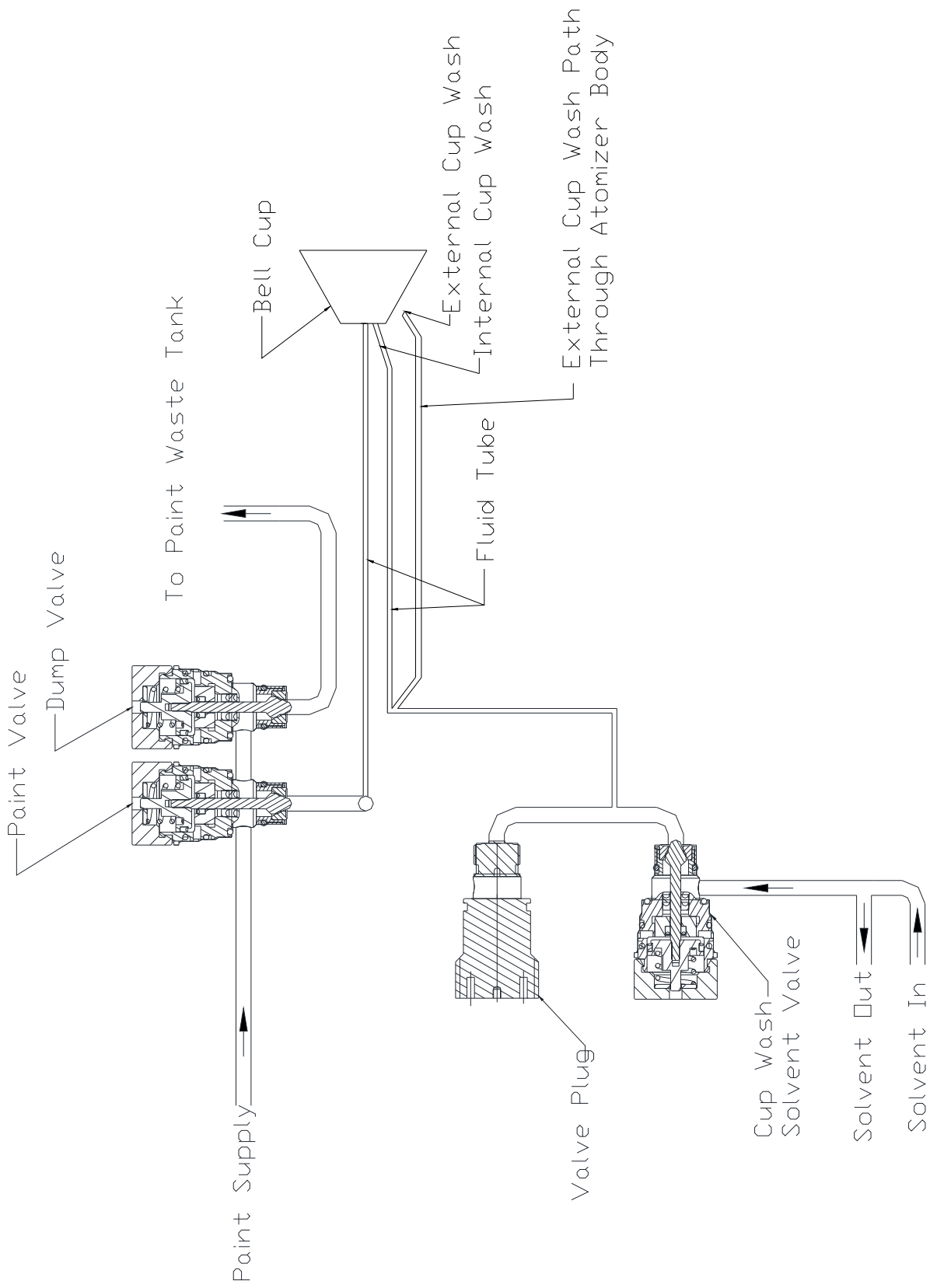
## INDIRECT CHARGE CIRCUIT DIAGRAM



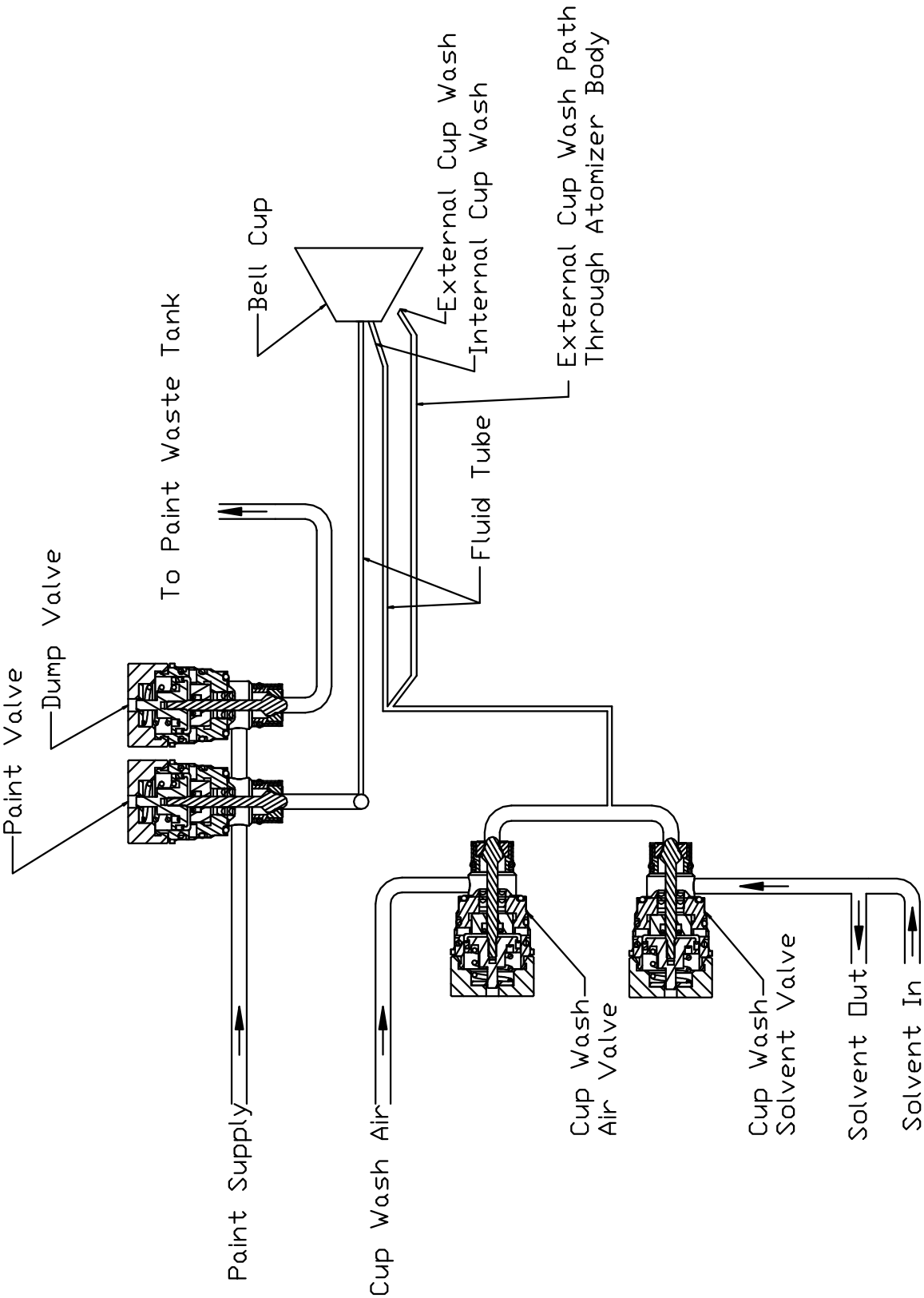
# DIRECT CHARGE CIRCUIT DIAGRAM



## DIRECT CHARGE VALVE SCHEMATIC



## INDIRECT CHARGE VALVE SCHEMATIC



# INSTALLATION

## AIR FILTER INSTALLATION

The following air filter installation guidelines are essential for optimum performance:

1. Use 25mm OD (1-Inch OD) minimum inbound main air line.
2. Use only recommended pre-filters and bearing air filters as shown in “Air Tubing Connections” chart in the ”Installation” section. Additional system air filtration (i.e., refrigerated air dryer) may also be used if desired.
3. Mount the bearing air filter as close as possible to the MMA-303. (DO NOT mount further than 30-ft. (9.1 meters) away.)
4. DO NOT use tape, pipe dope, or other thread sealant downstream of the bearing air filter. Loose flakes of tape or other sealant can break loose and plug the very fine air holes in the turbine air bearings.
5. Air heaters are highly recommended for use in the system to minimize the effect of excessively humid conditions and to maintain load capacity of turbine. If the heated air will exceed 120°F (48.9°C), the heater must be located after all filters to prevent damage to the filter media.

**N O T E**

Each applicator must have its own filter for bearing air. Recommended: RPM-418 or equivalent.

**Volume Booster Recommendation (Turbine Air):**

**Ransburg Part # A11111-00**

- Pilot Operated Regulator Non-Bleed Pilot
- 1/2-1/4 NPT Inlet and Outlet Ports
- Supply - 300 P.S.I.
- SCFM: 200
- Temperature Range: 40˚ - 120° F

| AIR TUBING C0NNECTIONS | | |
|---|---|---|
| | **Tube Size** | **Air Pressure Requirements** |
| Bearing Air Supply (B.A.) | 6 X 4mm (Yellow) | 90 psi +/- 10 kPa)<br>(621 +/- 69 kPa) |
| Bearing Air Return (BRG RTN) | 4mm (5/32") OD (Yellow) | 90 psi +/- 10 (at atomizer card<br>(621 +/- 69 kPa) |
| Turbine Air (T.A.) | 12 x 10mm | Variable |
| Cut-In Air (SAO) | 10 X 8mm | Variable |
| Pattern Control Air (SAI) | 8 X 6mm (Blue) | Variable |
| Brake Air (BRK) (if used) | 6 X 4mm (Orange) | 60-100 psi (414-689 kPa) |
| Paint Valve Control (PT) | 4mm (5/32") OD (Natural) | 80 psi +/- 10 (552 +/- 70 kPa) |
| Dump Valve Control (PD) | 4mm (5/32") OD (Gray) | 80 psi +/- 10 (352 +/- 70 kPa) |
| Cup Wash Solvent Valve Control (ST) | 4mm (5/32") OD (Blue) | 80 psi +/- 10 (352 +/- 70 kPa) |
| Cup Wash Air Valve Control (ATI) | 4mm (5/32") OD (Orange) | 80 psi +/- 10 (352 +/- 70 kPa) |
| Cup Wash Air (CWA) | 6 X 4mm (Green) | 80-100 psi (551-689 kPa) |

**N O T E**

With the exception of fluid, dump, and bearing air, all other pilot and air supply lines should be bulkheaded and their diameters increased one size.

## EQUIPMENT GROUNDING / SAFETY RECOMMENDATIONS

In electrostatic coating systems, the flow of high voltage power from the power supply to the atomizer is insulated from ground and isolated from all other functions equipment. When the voltage reaches the atomizer, it is transferred to the coating material where, by introducing a negative charge, it causes the atomized fluid to seek the nearest positive ground. In a properly constructed and operated system, that ground will be the target object.

The directed conduction of the electric charge, through its array of wires, cables, and equipment, is accompanied by a variety of stray electrical charges passing through the air by various means such as: air ionization, charged particles in the air and radiated energy. Such charges may be attracted to any conductive material in the spray area. If the conductive material does not provide a safe drain to electrical ground, which will allow the charge to dissipate as fast as it accumulates, it may store the charge. When its electrical storage limit is reached, or when it is breached by external circumstances (such as the approach of a grounded object or person, or one at lower potential), it may discharge its stored charge to the nearest ground. If there is no safe path to ground (such as a ground wire or braided cable) it may discharge through the air as a spark. A spark may ignite the flammable atmosphere of a spray area. The hazard area extend from the point of origin up to as much as a twenty-foot radius. (See the NFPA-33 for definition and limitations of a hazard area.)

It is a simple, but vital matter to be sure that all conductive objects within the spray area are grounded. All cabinets, housing, bases, supports, and stands, which are not by design, insulated from ground, be connected directly and **INDIVIDUALLY** to earth ground. ***Resting on a concrete floor or being attached to a building column may not always be sufficient ground.***

In order to provide the best ground connection possible, always attach a ground wire or insulated braided cable t the terminal indicated by the ground symbol and then to a proven ground. Always check ground connections for integrity. Some items, such as rotators and paint stands, may be supported on an insulator, but all components of the system up to the insulator **MUS**T be grounded.

**N O T E**

Ransburg recommends that ground connections to earth ground be 3/4" insulated copper braided wire. Grounds between assemblies within a machine should be ran to a central point within the machine using #18 insulated stranded copper wire minimum. All connections should be mechanically sound and have less than 5 ohms of resistance between assemblies and the common point. The resistance between the central point and earth ground should be less than 5 ohms as well.

Where items are mounted directly on structural components such as building columns, the ground connection MUST still be made. In many cases the structural component may be painted or coated with an insulated material and in all cases, the equipment will provide the necessary connection at one end, but the user must be sure that the other end is secured to an earth ground. This may be achieved by the use of a standard ground clamp (properly secured), by brazing or by piercing the structural component enough to assure connection. All ground connections should be made to the most conductive metallic structural ground available.

To be sure that everything is properly grounded, the following steps should be undertaken at least daily:

1. Inspect all ground wires. Look for good, firm joints at all points of connection. Look for breaks in the ground wire. Repair all defects IMMEDIATELY!
2. Inspect the floor or grates for excessive accumulation of dried coating material or other residue. If there is any, remove it!

**SAFE GROUNDING IS A MATTER OF PROPER EQUIPMENT MAINTENANCE AND INSTALLATION, CORRECT OPERATION AND GOOD HOUSEKEEPING.** Daily inspection of grounding apparatus and conditions, however, will help prevent hazards that are cause by normal operations.

**BE SURE THAT:**

1. All objects in the spray area are grounded.
2. Personnel in the spray area are properly grounded. (Conductive safety shoes and coveralls.)
3. That the target object is properly grounded (less than 1 megohm resistance).
4. That the high voltage is off except during normal application.
5. That the high voltage is off and applicators are grounded during maintenance operations.

## EQUIPMENT GROUNDING AND SAFETY RECOMMENDATIONs (Continues)

6. The spray area is kept free of accumulated coating deposits.
7. All combustible liquids in the spray area (outside of automatic delivery systems) are kept to minimum and are kept in fire safe, grounded containers. (See NFPA-30 and chapter 6 of NFPA-33.)
8. Proper ventilation is provided.
9. Personnel must thoroughly understand the equipment, its operation and maintenance, and all safety precautions.

## AIR HEATER REQUIREMENTS

Turbine drive air expands as it moves through the turbine wheel cavity and as it exits the turbine from the exhaust port. This expansion will cause cooling of the exhaust air and the surfaces it contacts. This same expansion cooling car occur across the shaping air exit ports. This cooling affect can cause surface temperatures to fall below the dew point of the booth, which will result in condensation on the interior and exterior of the atomizer, machine, and its components. It is even possible that the temperature of the supply air may be below the booth dew point, even without additional expansion cooling.

Condensation is especially probable in waterborne applications when booth temperature and relative humidity levels are typically maintained very high. This condensation will allow sufficient conductivity of the surfaces such that they act as an erratic ground source potential. This can cause damage to the equipment.

It is therefore, a requirement that turbine exhaust air temperature be maintained above the booth dew point to prevent condensation from forming on atomizer surfaces. Doing so will eliminate moisture as a potential defect in painted surfaces as well as extending equipment life. Thus, it is recommended that air heaters be installed into the atomizer air supply lines, i.e. turbine drive air, shaping air, and seal air. The air heaters must be of sufficient capacity, capable of raising the incoming air temperature at least 40°F (4.4°C) at a flow rate of 60 SCFM per applicator.

The actual air heater process setting depends on applicator fluid flow rate load, booth conditions, turbine airflow settings, and incoming air temperature. The heater should be set as low as possible, sufficient to maintain the applicator surface temperatures above the dew point in the booth.

Example: With the incoming air temperature at 72°F (22.2°C), and MMA-303 with 65mm bell cup rotating unloaded at 60 krpm has a turbine outlet temperature drop of approximately 28°F (-2.2°C) @ 40 krpm unloaded, ∆~14°F (-10°C). Referring to the ASHRAE Psychrometric chart, the saturation temperature range (dew point) of a spray booth maintained at 70-75°F/65-70% RH is 62 -68°F (21.1-23.9°C/65-70°RH is 16.7-20°C). Thus it is almost certain that the surface temperatures of the applicator will fall below the dew point of the booth, and an air heater will be needed in this case.

To prevent condensation, an Ransburg Air Heater Assembly (A11065-05) should be assembled after the air filters. (Reference the current “Air Heater Assembly “ service manual for further information.)

**N O T E**

Failure to use an air heater may cause damage to equipment or ruin the finished component being processed.

Connect air heater to turbine air tubing.


**A11065-05 Air Heater**

| AIR FILTRATION REQUIREMENTS | | |
|---|---|---|
| **Ransburg Filter Model No.** | **Description / Specifications** | **Replacement Element Part No.** |
| HAF-503 | Pre-filter, removes coarse amounts of oil, moisture and dirt. Used upstream of HAF-508 pre-filter (used in systems with poor air quality. | HAF-15 Element One |
| HAF-508 | Pre-filter, coalescing type, 136 SCFM, 98.5% efficiency particulate removal .3 to .6 micron, max. aerosol passed 1.0 micron, max. solid passed .4 micron (dependent upon SCFM requirement per applicator, one HAF-508 can be used with up to three MMA-303assemblies). | HAF-38 Elements, Carton of 4 |
| RPM-418 | Bearing air filter, coalescing type,19 SCFM, 99.995% efficiency particulate removal .3 to .6 micron, max. MMA-303passed .6 micron max. solid passed .2 micron (one per MMA-303) | RPM-33 Elements, Carton of 8 |

**! CAUTION**

- Air must be properly filtered to ensure extended turbine life and to prevent contamination of the paint finish. Air which is not adequately filtered will foul the turbine air bearings and cause turbine failure. The correct type filters musts be used in an MMA-303system. The filter elements must be replaced regular schedule to assure clean air.
- It is the user's responsibility to ensure clean air at all times. Turbine failure resulting form contaminated air will not be covered under warranty. If other filters are incorporated in the system, the filters to be used must have filtering capacities equal or better than those shown in "Air Filtration Requirements Charts."
- The user must ensure the bearing air supply is not inadvertently turned off while the MMA-303air motor is turning. This will cause air bearing failure.

**NOTE**

- Each applicator must have its own filter for bearing air. Recommended: RPM-418 or equivalent.

### MOUNTING

The MMA-303 is equipped with a quick disconnect assembly. The quick disconnect feature consists of a mounting manifold which is permanently attached to the applicator through a wrist adapter plate. The turbine manifold assembly is secured to the mounting manifold with a threaded disconnect ring.

## ELECTRICAL AND FIBER OPTIC CONNECTIONS

The fiber optic connection is made on the back of the atomizer's mounting manifold. The fiber optic cable comes pre-assembled with connectors that are secured in place with a fiber optic tensioning fitting.

Maximum amount of splices for any length of cable is 3. The speed detection signal may be affected if splices are exceeded. Length in any combination for the fiber optic is 100-feet.

## FLUID CONNECTIONS

The paint, solvent, and dump fluid tubing are connected on the back of the mounting manifold with plastic fluid fittings. The tubing is made of PFA. Fluid tubing requirements are shown in "Fluid Tubing Connection Requirements" chart below.

## TYPICAL INSTALLATION

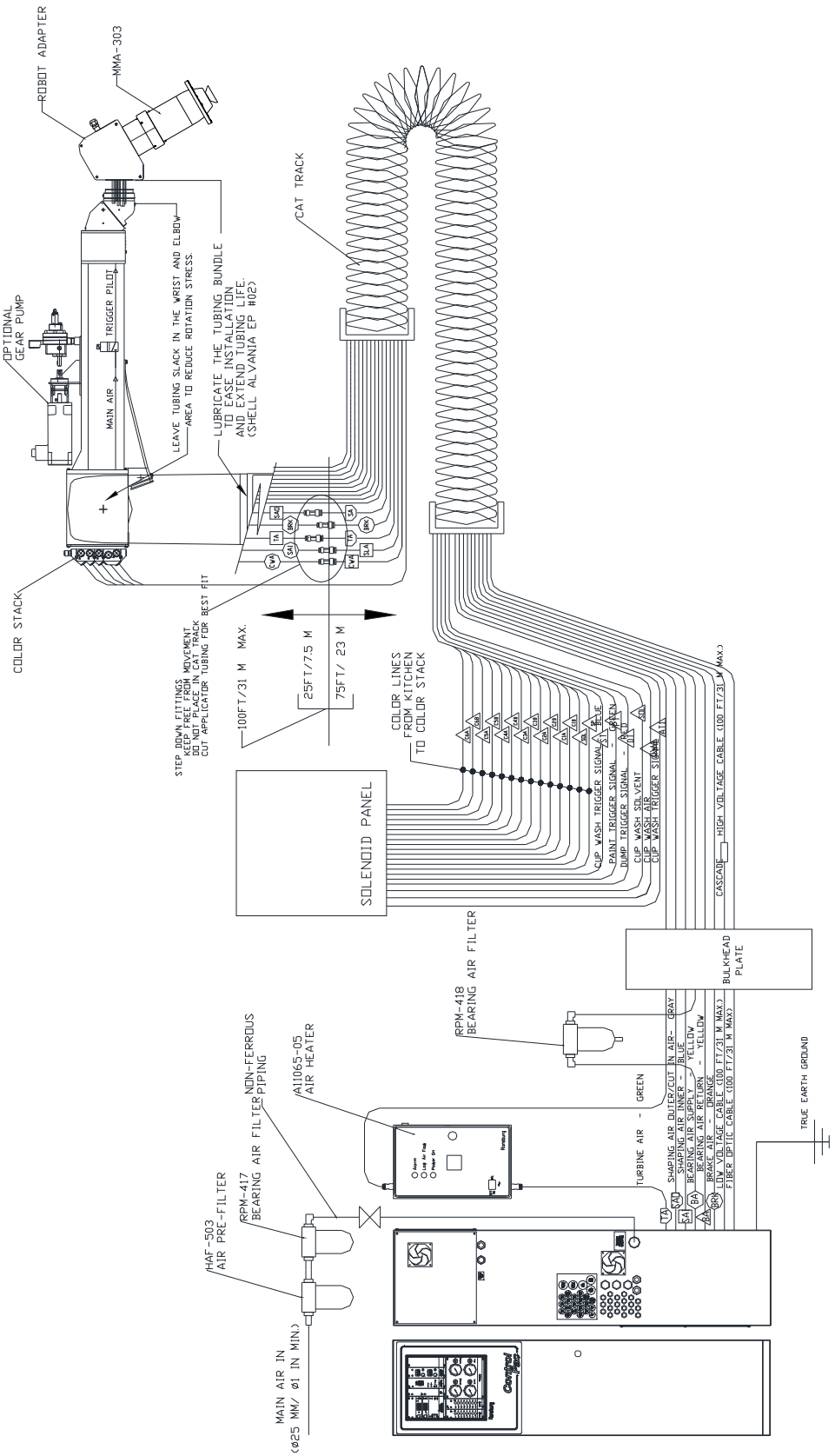
The "Direct and Indirect Charge Typical Installation" figures in the "Installation" section shows a typical installation of the applicator with the MicroPak.

## AIR HEATER

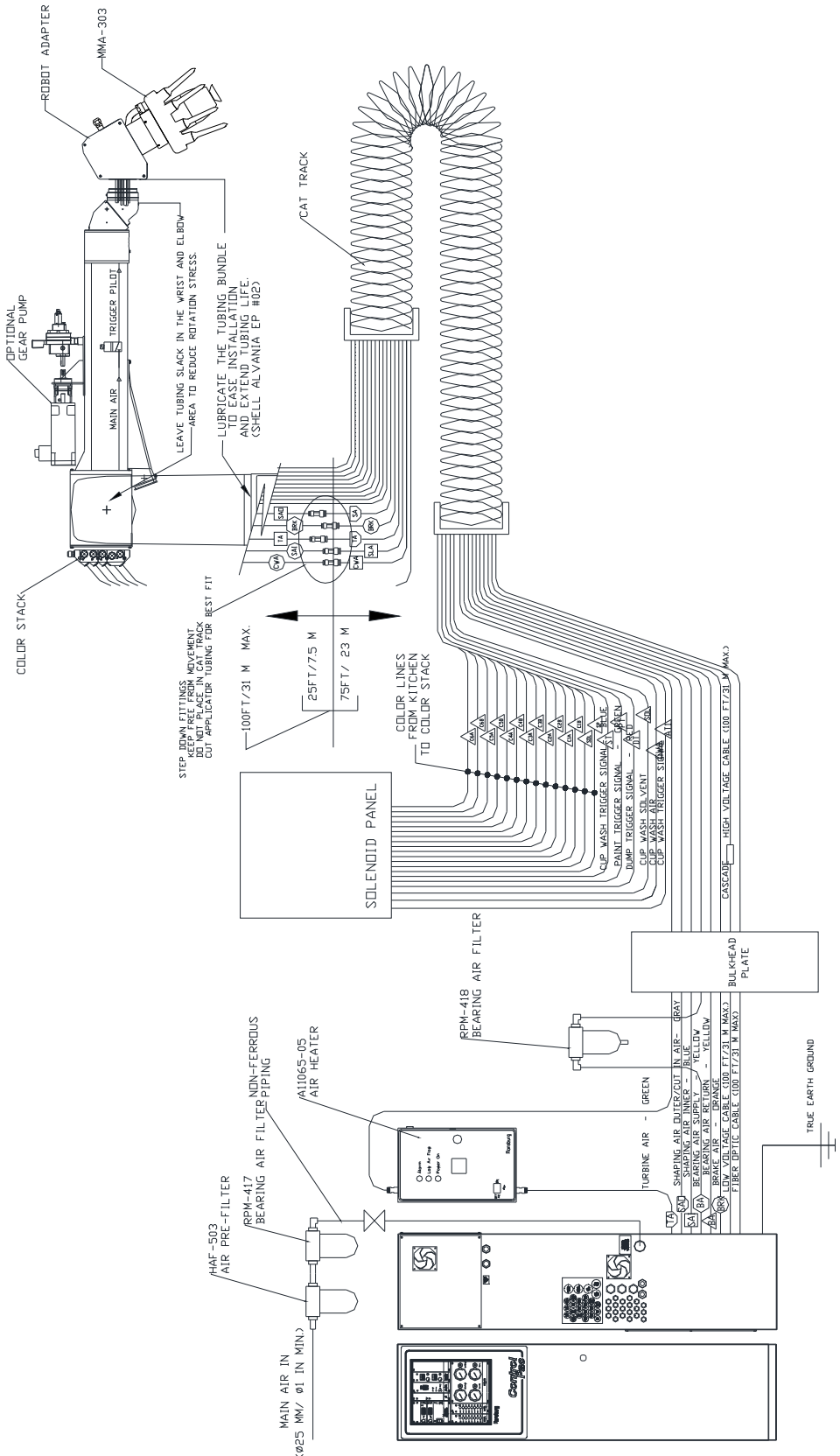
Connect air heater to turbine air tubing. Air heater connection to bearing air is not required.

| FLUID TUBING CONNECTION REQUIREMENTS | | |
|---|---|---|
| | **Fixed Atomizer** | **Pressure (Maximum)** |
| Paint Line (P) | 6mm OD / PFA | 200 psi max. (1379 kPa) |
| Cup Wash Solvent Line (SOL) | A11283-00 Nylon Recirculation Tube-In-Tube, Indirect Charge | 150 psi max. (1033 kPa) |
| Dump Line (DL) | 8mm OD / PFA | 200 psi max. (1379 kPa) |

# DIRECT CHARGE TYPICAL INSTALLATION



# INDIRECT CHARGE TYPICAL INSTALLION



## INTERLOCKS

The following system interlocks are required to prevent equipment damage:

- Bearing air should remain on at all times and should be shut-off by turning off the main air to the pneumatic control cabinet.
- It should not be possible for the coating material to be sprayed unless the turbine is spinning.
- Two inter-connected bearing air ports are provided, one for supply air and the other to be used as a return signal for measuring bearing air pressure at the atomizer. If bearing air falls below 80 psi (551.6 kPa) at the atomizer, the turbine air should be automatically interlocked to shut off. This interlock is provided by the Serial Atomizer Module. (See current “Serial Atomizer” service manual.)
- High voltage must be interlocked with the solvent valve pilot signal to prevent solvent flow while high voltage is energized (direct charge only).
- It is recommended that the booth entry door be interlocked with high voltage and turbine speed to prevent possible personal injury.
- Turbine air and brake air must be interlocked to prevent both from being used simultaneously. This interlock is provided by the serial atomizer mode. (See current ”Serial Atomizer” manual.)
- Any other interlocks required by local national code or international code.

**C A U T I O N**

•When the turbine air is turned off, the turbine will continue to operate or “coast down” for about two minutes. Provisions should be made to assure that the operator waits at least three minutes, after shutting off the turbine air and before shutting off the main air supply.

•Bell cup must be removed when making flow checks. If the paint is turned on when the bell is mounted and the turbine shaft is not rotating, paint will enter the shaft and possibly damage the air bearing. Material flow checks (flow rate verification) must be made with the bell cup off and the turbine not rotating. Normally pneumatic interlocks will not allow the paint to trigger on when the turbine air is off. These interlocks may need to be bypassed with proper safety procedures as required.

•Bell cup must be rotating at least 20,000 rpm when fluid is triggered. Turning on fluid without the bell cup spinning may flood the turbine and cause damage to components. Fluid flow and turbine rotation must have an interlock in place.

**W A R N I N G**

•The high voltage and/or coating material must never be turned on unless the bell cup is mounted on the motor shaft and the turbine is rotating.

•Pneumatic input to the turbine air inlet must be controlled to prevent the turbine from exceeding the maximum rated speed of 70,000 rpm. (See “Specifications” in the “Introduction” section.)

•High voltage must never be turned on while cleaning solvent is being sprayed either through the applicator supply or the cup wash line. High voltage and both solvent triggers must b e interlocked (direct charge only).

•Never spray solvent with high voltage on (direct charge only).

# N O T E S

# 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 MMA-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:

- Coating materials
- Fluid flow rate control
- Fluid valve control
- Turbine speed
- Bearing air adjustment
- Internal shaping air (pattern control)
- External shaping air (cut-in-air)
- Brake air
- 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.

## FLUID FLOW RATE CONTROL

Externally mounted fluid regulators or gear pumps are typically used to control fluid flow. Paint is supplied to the MMA-303 by way of the tubing bundle through the robot arm.

The atomizer assembly is equipped with micro valves which are pneumatically operated to direct the flow of paint to either the feed tube or dump line and to supply an intermittent solvent to clean the interior and exterior of the bell cup.

The feed tube has several sized removable tips available from .7mm - 1.6mm (.027-inch - .062-inch).. The viscosity and volume of the coating material being sprayed determine the correct size of feed tube tip for each installation. (Reference “Fluid Tip Flow Rate” chart in the “Introduction” section.)

**Fluid Flow Rate Check**

In the test mode, the flow rate can be measured by removing the bell cup from the atomizer, turning the fluid flow on, and capturing the material in a graduated beaker or measuring cup for a fixed period of time (shaping air, high voltage, and turbine air must be off).

## FLUID VALVE CONTROL (Trigger, Dump, and Solvent)

**WARNING**

**•Danger of shock and/or personal injury can occur. Proper grounding procedures must be followed. Personnel must never work around the turbine when the turbine is spinning or when high voltage is turned on.**

(See "Indirect and Direct Charge Circuit Diagram" in the "Introduction" section.) The fluid valves in the MMA-303 are actuated by an air signal. The air pressure must be greater than 70 psi (482.6 kPa) to assure proper actuation of the valve. Applying air to the valve actuator turns on the fluid or air for that valve.

The paint trigger valve controls the paint flow to the bell. When actuated, paint flows through the valve to the fluid tube, and into the rear of the bell cup. The bell cup must be spinning at least 30,000 rpm when fluid is turned on to enable the fluid to flow through the bell paint passage and be atomized.

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 trigger valve since the trigger valve is intended to cause the fluid to flow to the bell at the prescribed input pressure.

The solvent valve controls the flow of cup wash solvent. When actuated, solvent flows through a separate fluid tube passage and into the bell cup. This provides cleaning of the inside of the bell cup. The outside of the cup is simultaneously cleaned by a nozzle mounted on the shaping air ring and shroud. The solvent valve should never be triggered at the same time as the paint trigger valve to prevent solvent from flowing backward into the paint line.

The cup wash air valve controls the flow of air. It is recommended that this valve and the solvent valve be controlled to create an air/solvent chop sequence for superior internal and external cup cleaning.

To color change the applicator, a solvent air chop must be provided through the main paint line (see "Direct and Indirect Charge Typical Installation" in the "Installation" section).

**WARNING**

**•Never perform the interior/exterior cup clean process with high voltage on.**

**•The normal fluid flow range is 25-700 cc/min. During a color change or when flushing the system, higher flow rates may be required. However, the maximum flow rate through the bell cup must not exceed 700 cc/min. to avoid solvent or paint from flooding into the internal portion of the air bearing motor assembly or front shroud.**

**•High voltage must be interlocked with the solvent valve to prevent solvent spraying while high voltage is on (direct charge only).**

## TURBINE SPEED

Turbine speed is determined by the input air pressure/flow at the rear of the atomizer.

Turbine speed is intended to be closed loop controlled using the fiber optic speed transmitter, located on the turbine manifold. A speed input to a remote speed controller, such as the Serial Atomizer Module, is required. (See "Speed and Pressure" charts in the "Introduction" section.)

**CAUTION**

•Bell cup must be rotating at least 20,000 rpm when fluid is triggered. Turning on fluid without the bell cup spinning may flood the turbine and cause damage to components. Fluid flow and turbine rotation must have an interlock in place.

**NOTE**

The bell rotational speed determines the quality of atomization and can be varied for various paint flow rates and paint formulations. For optimum transfer efficiency and spray pattern control, the bell rotational speed should be set at the minimum required to achieve proper atomization. **Excessive speed reduces transfer efficiency!**

**WARNING**

•**DO NOT** exceed the maximum rated operating speed and turbine inlet pressure. Excessive speed may cause air turbine damage or damage to the bell.

## BEARING AIR ADJUSTMENT

The nominal bearing air pressure is 90 psi (620.5 kPa), measured at the rear of the atomizer. Minimum pressure is 80 psi (551.6 kPa) and maximum pressure is 100 psi (689.5 kPa). The turbine should never be operated with less than 80 psi (551.6 kPa) bearing air pressure.

Bearing air must be present when turning the turbine on. Bearing air must remain on when the turbine air is turned off until the turbine stops spinning. Never turn off bearing air to cause the turbine to stop spinning. If connected, brake air can be used to slow the turbine.

The MMA-303 is equipped with a bearing air return line to monitor bearing air pressure at the mounting manifold. When connected to the remote Serial Atomizer speed controller, operation of the turbine will automatically be shut down whenever the bearing air pressure falls below the dip switch setting of 80 psi (551.6 kPa).

**CAUTION**

•Bearing air **MUST** be **ON** and supplied at a minimum of 80 psig (551.6 kPa) whenever the turbine is operated. If not, severe bearing damage will occur. It is recommended that bearing air be left turned on at all times, except during maintenance or disassembly.

•Bearing damage (and subsequent turbine failure) caused by running the turbine without bearing air **WILL NOT** be covered under the Ransburg warranty.

## CUP WASH

It is recommended for <u>water based</u> material that heated solvent be recirculated at the rear input of the atomizer (140°F, 60°C). Typical wash solvent is di-water and amine (8-10% solution).

## SHAPING AIR KIT #1

**A12874-01/02 Shaping Air Kits for 55mm Bell Cups (A11730-00/01 and A11783-00) (Pattern Control Air - Direct Charge Only)**

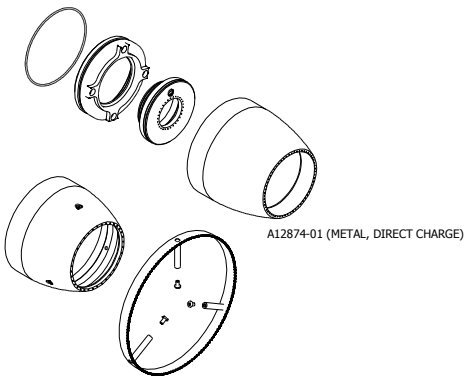
Shaping air is used to control the shape and size of the spray pattern. Lower pressure yields larger patterns, high shaping air pressure creates a smaller pattern. Higher inner shaping air may assist with penetration of at-

omized particles into cavity areas. The amount of inner shaping air should be optimized for the specific applications. Excessive air pressure will cause atomized particles to blow by the target, reducing electrostatic wrap and lowering transfer efficiency. Excessive air may also cause some paint particles to bounce off the target and deposit on the atomizer.

Connection is made using the “blue” 8mm tube labeled “SAI” on the tubing bundle. The other 8mm tube is labeled “SAO” and is “gray” in color and must be plugged. However, if additional air is required, this tube can be connected to a secondary controlled air source. Precautions must be taken that one does not have a significantly higher pressure than the other to avoid back flow. This shaping air combination can be used with either the aluminum 55mm bell cup or the 55mm Titanium bell cup. “Air Flow” information can be found in the “Introduction” section of this manual.

**N O T E**

A minimum of 70 slpm (2.6 SCFM) should always be kept flowing in the shaping air passage to keep the face of the applicator clean during manual cleaning breaks.



A12874-01 (METAL, DIRECT CHARGE)

A12074-02 (METAL, DIRECT CHARGE WITH RING)

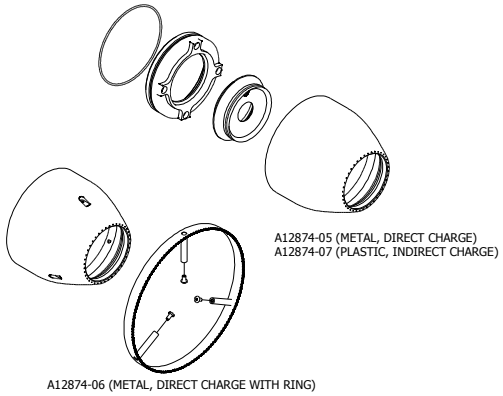
## SHAPING AIR KIT #2

**A12874-05/06 Shaping Air Kits (Mono Flex Air - Direct Charge) A12874-07 Shaping Air Kit (Mono Flex Air - Indirect Charge) for Use with All 65mm Bell Cup Only)**

The shaping air is supplied so that it is counter to the rotation of the bell cup. This combination will provide a pattern size from 10-inch to 24-inch (250mm - 610mm) depending on air flow, fluid flow, and cup rotation speed. Connection is made using the “blue” 8mm tube labeled “SAI” on the tubing bundle. The other 8mm tube labeled “SAO” is “gray” in color and must be plugged. However, if additional air is required, this tube can be connected to a secondary controlled air source. Precautions must be taken that one does not have a significantly higher pressure than the other to avoid any back flow. This shaping air combination can be used with any 65mm bell cup. (See “Pressure and Flow Data Charts” in the “Introduction” section.)

**N O T E**

A minimum of 70 slpm (2.6SCFM) should always be kept flowing in the inner shaping air passage to keep the face of the applicator clean during manual cleaning breaks.



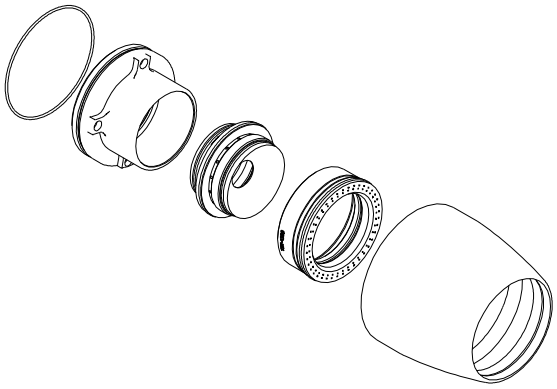
A12874-05 (METAL, DIRECT CHARGE)
A12874-07 (PLASTIC, INDIRECT CHARGE)

A12874-06 (METAL, DIRECT CHARGE WITH RING)

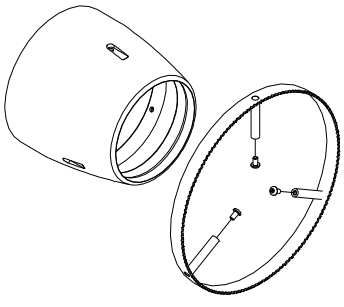
## SHAPING AIR KIT #3

**A12874-08/09 Dual Flex Shaping Air Kits (for 65mm Bell Cup )**

Both shaping air outlets supply air that is counter to the rotation of the bell cup. This combination will provide a pattern size from 3-inch to 10-inch (76mm - 254mm) depending on bell rotation speed, fluid flow, and air flow. Both sets of shaping air holes are independently controlled. The inner set of holes are supplied by connecting the “blue” tube labeled “SAI” on the tubing bundle to a regulated air source. The outer set of shaping air holes are supplied by connecting the “gray” tube labeled “SAO” on the tubing bundle to a regulated source. The air supplies work in combination with each other to provide desired results. This combination of shaping air can be used with any 65mm bell cup.



A12874-08 (METAL, DIRECT CHARGE)
A12874-10 (PLASTIC, INDIRECT CHARGE)
A12874-11 (PLASTIC, INDIRECT CHARGE)



A12874-09 (METAL, DIRECT CHARGE WITH RING)

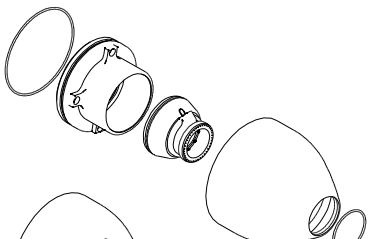
## SHAPING AIR KIT #4

**A12089-03/04 Shaping Air Kits (Dual Air - Direct Charge) for Use With 30mm Bell Cup Only**

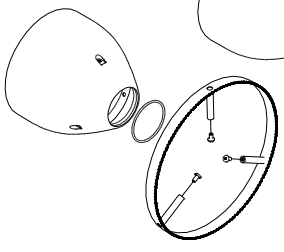
This combination provides for two air sources to gain better pattern control, eliminates a secondary “ghost” pattern, and the ability to penetrate into deep cavities. The first air is connected to the “blue” tubes labeled “SAI” on the tubing bundle. This air exits through an annulus between the outside diameter of the ball cup and the inside diameter of the shaping air manifold. The second air is connected to the tube labeled “SAO” and is “gray” in color. This air exits a concentric series of holes at the front of the atomizer. This shaping air combination can be used with either the aluminum 30mm bell cup or the Titanium 30mm bell cup. “Air Flow” information can be found in the “Introduction” section of this manual.

**N O T E**

A minimum of 70 slpm (2.6 SCFM) should always be kept flowing in the inner shaping air passage to keep the face of the applicator clean during manual cleaning breaks.



A12874-03 (METAL, DIRECT CHARGE)

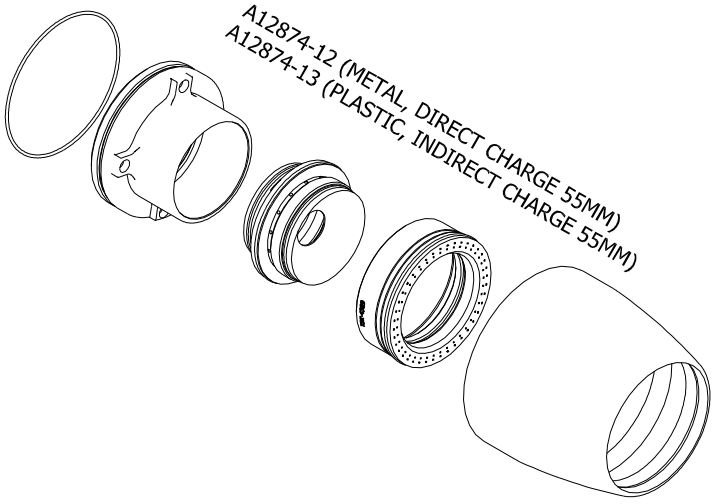


A1274-04 (METAL, DIRECT CHARGE WITH RING)

## SHAPING AIR KIT #5

**A12874-12/13 Dual Flex Shaping Air Kits (for 55mm Cups)**

Both shaping air outlets supply air that is counter to the rotation of the bell cup. Both sets of shaping air holes are independently controlled. The inner set of holes are supplied by connecting the “blue” tube labeled “SAI” on the tubing bundle to a regulated air source. The outer set of shaping air holes are supplied by connecting the “gray” tube labeled “SAO” on the tubing bundle to a regulated source. The air supplies work in combination with each other to provide desired results. This combination of shaping air can be used with any 65mm bell cup.



## BRAKE AIR

Brake air is used to slow the turbine speed in a minimum length f time. It is advantageous for short cycle times during color change, or may be used to reduce speed or stop the turbine. never operate brake air with the turbine air on.

Approximate brake times to reduce the turbine speed are shown in “Deceleration Time Chart” in the “Introduction” section. These times are based on 60 psi (413.7 kPa) and 100 psi (689 kPa) air pressure at the back of applicator.

## ELECTROSTATIC VOLTAGE

The MMA-303 Indirect Applicator receives a low voltage control input from the MicroPak to control the operating electrostatic voltage. (Refer to the current MicroPak manual for detailed Operating Instructions.) Refer to the current MicroPak service manual for detailed operating instructions, safety cautions, and settings.

**N O T E**

If paint defects occur, such as fatty edges or picture framing, reducing the voltage should be a last resort. To correct the problem, lead and lag trigger adjustments should be optimized first.

The electrostatic voltage applied to the MMA-303 will affect pattern size, transfer efficiency, wrap and penetration into cavity areas. A setting of 30-70 kV is appropriate for most direct charge applications and 30-70 kV for most indirect charge applications..

## TARGET DISTANCE

The distance between the MMA-303 atomizer and the target will affect the finish quality and efficiency. Closer distances give a smaller pattern, wetter finish, and greater efficiency. Greater distance will provide a large pattern size and drier finish. The MicroPak control circuit will enable the applicator bell to be operated to within a few inches of the target without adjusting the voltage setting. The recommended target distance is 6 to 12-inches (152.4-304.8mm). In general, allow 1-inch (25.4mm) target distance for every 10kV.

## GENERAL OPERTING SEQUENCE - DIRECT / INDIRECT CHARGE

**CAUTION**

•It is recommended to leave bearing air on, unless the applicator is being serviced or removed for service.

Normally, for painting application, the process sequence should always be:

- Bearing air on (always On)
- Turbine air on
- Turbine speed to application speed
- Shaping air on
- Start fluid flow off part
- Voltage on

After spraying the object, the sequence should be:

- Voltage lowered to 30-50 kV
- Fluid off
- Shaping air to setback volume
- Turbine speed to set back speed (30,000 rpm recommended)

Recommended sample cup flush sequence is as follows (voltage must be off) (internal and external cup wash):

1. Turbine speed set to 25,000-30,000 rpm.
2. Set to 350-450 slpm (12.4-15.9 SCFM).
3. Point atomizer at a grounded object such as a booth grate.
4. Maintain solvent pressure of 100-150 psi (689-1,034 kPa). Maintain air push pressure at 80-100 psi (552-689 kPa).
5. Use an alternating trigger sequence of solvent/air to create a chopping effect. Always ensure that the last step in the sequence is an air push.

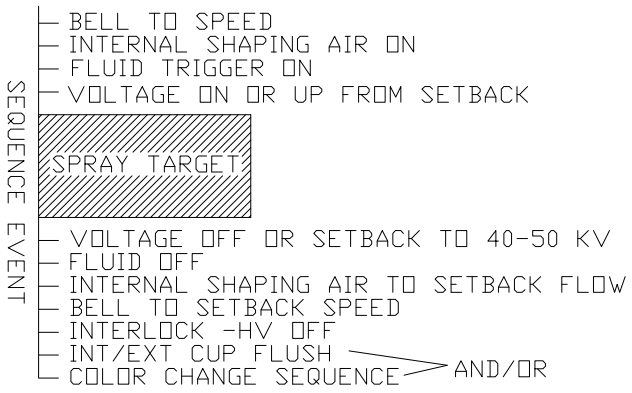
A typical sequence is .2 seconds solvent, 1.0 second air push, 1.7 seconds solvent and 2.0 seconds final air push. This sequence may be modified for other paints and applications.

6. It is recommended that an in-line fluid filter be installed to ensure that no foreign debris enters the fluid tip or the external wash nozzle.

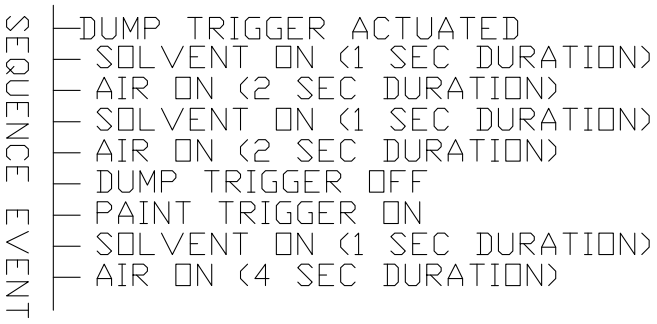
The MMA-303 is versatile in processing the finish of a component. It can be setup as shown in “Typical Paint Sequence” figure.

Recommended sample cup purge sequence is as follows (voltage must be off) (internal cup cleaning):

1. Turbine speed set to 25,000-30,000 rpm.
2. Increase shaping air to 350-450 slpm (12.4-15.9 SCFM).
3. Paint atomizer at booth grate or insert into bell cleaning station.
4. Maintain solvent pressure of 100-150 (689 -1,034 kPa). Maintain air push pressure at 80-100 psi (552-689 kPa).
5. Use an alternating trigger sequence of solvent/air to create a chopping effect. Always ensure that the last step in the sequence is an air push.
6. A typical sequence is .3 seconds solvent, 1.7 seconds air push, repeat 3 times. This sequence may be modified for other paint and applications.




**Typical Paint Sequence**




**Typical Color Change Sequence**

Sequence Event Explanation:

1. **Bell to Speed** - This is accomplished by a set point command from either the PLC, robot, or other input device, through the I/O module.
2. **Shaping Air** - Set to 350-400 SCFM while performing a cup flush.
3. **Voltage On** - The voltage is turned on from a signal to the MicroPak. The lag time to full voltage may be reduced if a setback voltage is used. Recommended setback voltage is between 30 kV and 50 kV.
4. **Trigger Fluid** - An air signal is sent through the PT line of the tubing bundle. This should occur when the target is 6-12-inches (152.4-304.8mm) from the applicator centerline. (Not to be confused with target distance.)
5. **Voltage Off/Setback Voltage** - Immediately precedes the trigger off. Using a setback voltage shortens the cascade voltage ramp up time.
6. **Fluid Trigger Off** - This should occur when the target is typically 0-6-inches (0-152.4mm) past the applicator centerline.
7. **Shaping Air to Setback** - The setback flow of air should never be below 70 slpm (2.6 SCFM) for the inner shape air except when performing a cup flush sequence..
8. **Color Change Sequence** - Used when color is changed one to the other. Typical sequence is shown in “Typical Color Change Sequence” figure in the “Operation” section. **(Note: During this sequence, the applicator should be moved to a position to collect the waste material.)** The sequence shown is a starting point for processing, but the final sequence will depend on the material being sprayed and the solvent used to purge the applicator with.

## PROTECTIVE COVERS

It is recommended to use covers to reduce the amount of overspray build-up on the shroud and electrodes. Two covers are available, a white lint free stretch cloth for covering the probes and a foam cover (green) for the front shaping air shroud. The white cloth cover should cover all of the electrode except for the last 1-inch (25-4mm). The green foam cover should be installed until just past the radius edge of the shroud. Care is to be taken when installing the white cloth covers over the electrodes, do not bend them. (Devise a fixture to help slide the cover over easier.).

When cleaning, do not get covers wet, it will attract more overspray, more quickly. Push them back, clean surface, dry thoroughly, and slide back to original position. Depending on conditions, covers should be replaced after each shift (8 hours).

A11565-00 White Stretch, Lint Free Covers

A11564-00 - Foam Elastic Covers (Green)

# MAINTENANCE

## O-RINGS

All O-rings in this atomizer are solvent proof except the ones on the air bearing spindle. These O-rings must not be soaked in solvent; if these are exposed or soaked in solvent, they must be replaced. These O-rings are engineered to provide a fit between the air bearing spindle and it's mating parts to reduce or eliminate harmonic resonance (vibration).

Some O-rings are encapsulated. These O-rings have a limited amount of stretch and will not return to their original diameters if over stretched. These O-rings are subject to being distorted more easily than rubber O-rings, so it is important that they be sufficiently lubricated when mating parts are installed onto them. They also will take a square set over time and should be replaced periodically if mating parts are removed repeatedly or if a new mating part is installed onto them.

Any O-ring that is cracked, nicked, or distorted must be replaced.

A suitable lubricant is food grade petroleum jell or A11545-00 Petrolatum Jell.

## CLEANING PROCEDURES

**! WARNING**

**•Electrical shock and fire hazards can exist during maintenance. MicroPak supply must be turned off before entering the spray area and performing any maintenance procedures on the atomizer. Spray booth fans should remain on while cleaning with solvents.**

**•Never touch the atomizer bell while it is spinning. The front edge of the bell can**

**! WARNING (Continued)**

**easily cut into human skin or cut through gloves and other materials. Be sure the atomizer bell has stopped spinning before attempting to touch it. Approximate time for the bell to stop spinning after turning off turbine drive air is three minutes.**

**•Ensure high voltage is off during any manual cleaning procedure.**

In addition to the above Warning, which relates to potential safety hazards, the following information must be observed to prevent damage to the equipment.

**! CAUTION**

•**DO NOT** immerse the MMA-303 turbine in solvent or other liquids. Turbine components will be damaged and warranty will be voided.

•Bearing air must be on during all cleaning procedures to protect the air bearing components.

**Internal Fluid Path Purge Cleaning**

Cleaning the incoming paint line (from paint supply source such as color manifold through the fluid manifold and bell assembly): Turn off the high voltage and turn on the color stack trigger valve for solvent supply. With the bell spinning, flush cleaving solvent through the incoming paint line and through the manifold passages, and out through the dump valve. Use restricted bell wash solvent to clean the fluid tube and bell cup. The spinning bell will atomize the solvent and clean out the bell passages. If desired, open the dump valve to flush through the dump line for a faster and contained system flush.

## CLEANING PROCEDURES (Cont.)

**CAUTION**

•The maximum flow rate of 700 cc/min. must not be exceeded during a flush routine. Use of an in-line fluid restrictor is recommended. (Example: Hosco P/N RIL-6-AJ or similar).

**External Atomizer Surface Cleaning**

- Verify that the high voltage is turned off.
- All external surfaces may be cleaned using a mild solvent and lint free rags to hand wipe the MMA-303. Turbine drive air must be off, but leave bearing air on. The shaping air should have approximately 70 slpm air flow through each to prevent the solvent from entering these passages.
- Do not spray the MMA-303 unit with a solvent applicator used for cleaning. The cleaning fluid under pressure may aid conductive materials to work into hard to clean areas or may allow fluids to be forced into the turbine assembly.
- Do not reuse an atomizer bell cup that shows any sign of damage such as nicks, heavy scratches, dents, or excessive wear.
- Always final wipe all parts with a non-polar solvent and wipe dry (high flash Naphtha, etc.).

**WARNING**

**•NEVER wrap the applicator in plastic to keep it clean. A surface charge may build up on the plastic surface and discharge to the nearest grounded object. Efficiency of the applicator will also be reduced and damage or failure of the applicator components may occur. WRAPPING THE APPLICATOR IN PLASTIC WILL VOID WARRANTY. To reduce the risk of fire or explosion, OSHA and NFPA-33 require that solvents used for exterior cleaning, including bell cleaning and soaking, be nonflammable (flash points higher than 100°F/ 37.8° C). Since electrostatic equipment is involved, these solvents should also be non-polar. Examples of non-flammable, non-polar solvents for cleaning are: Amyl acetate, methyl amyl acetate, high flash naphtha, and mineral spirits.**

**•Do not use conductive solvents such as MEK to clean the external surfaces of the MMA-303 without a second cleaning with a non-polar solvent.**

**•When using a rag to hand wipe the MMA-303, the turbine air should be off, but leave both the shaping air and bearing air turned on. Ensure that rotation has come to a complete stop.**

## VIBRATION NOISE

If the MMA-303 is vibrating or making an unusually loud noise, it usually means there is an imbalance situation. The atomizer bell cup may have dried paint on it or the bell may be physically damaged., or there may be paint trapped between the bell cup and shaft preventing the bell cup from properly seating. If any of these conditions exist, they **MUST** be corrected. Excessive imbalance caused by

one of the conditions may result in bearing damage and turbine failure. Warranty **DOES NOT** cover failure caused by imbalanced loading conditions.

To determine if the bell is dirty or damaged, remove the bell cup and turn the turbine ON. If the noise is eliminated, the bell cup is the problem. If the noise continues, the turbine may be damaged and should be inspected. Excessive air required to achieve same speed may indicate a faulty or contaminated turbine. **DO NOT** continue to operate a noisy turbine.

**⚠ WARNING**

**•If a bell cup comes off a rotating shaft because of motor seizing or any other reason, the atomizer and bell cup must be returned to Ransburg for inspection and evaluation to determine if the bell can be used in operation.**

## TURBINE MAINTENANCE

**DO NOT** attempt to rebuild the turbine. Any endeavor to disassemble a turbine during the warranty period will void the warranty. The turbine is non-field serviceable. Contact your authorized distributor or Ransburg for instructions.

**REPLACEMENT ELEMENTS**

| Part # | Qty. Elements Per Carton | Used On |
|---|---|---|
| HAF-5 | 1 | HAF-515, Pre-Filter |
| RPM-32 | 4 | RPM-417, Pre-Filter |
| RPM-33 | 8 | RPM-418, Bearing Air Filter |

## GENERAL MAINTENANCE

Verify daily that the operating parameters have not varied significantly from the normal. A drastic change in high voltage, operating current, turbine air, or shaping air, can be an early indicator of potential component failure.

A laminated poster entitled “Rotary Atomizer Checklist” (AER0075-02) is included with the assembly in the Literature Kit to be posted near the station as a handy reference.

Due to the close proximity of high voltage to ground potential, a schedule must be developed for equipment maintenance (cleanliness).

### PREVENTIVE MAINTENANCE

#### Daily Maintenance (During Each Preventive Maintenance Break)

1. Verify that high voltage is OFF and that both inner and outer shaping air, bearing air, and turbine drive air are ON.
2. Open the dump valve, flushing all paint from the supply lines and valve module.
3. Open the solvent valve, flushing all paint from the fluid tube and through the atomizer bell assembly.
4. Re-verify that high voltage is OFF, turbine drive air is OFF, and that the bell cup has stopped spinning. The bearing air and shaping air should remain ON.
5. Clean all external surfaces of the applicator using a lint-free rag dampened with solvent.
6. After cleaning, all conductive residue must be removed using a non-conductive solvent. Since electrostatic equipment is involved, these solvents should also be non-polar (Naphtha).

**PREVENTIVE MAINTENANCE (Continued)**

7. Inspect bell cup for nicks, dents, heavy scratches, or excessive wear. Replace if necessary.
8. Check bell cup tightness. Tighten to 50-70 lbs•in (5.65-7.91 Nm) torque.
9. Check the amount of paint build-up on the outer protective cloth covers, if used. If excessive, replace covers as required. If cloths are wet, find source and replace with dry cloth covers.

**WARNING**

**•The high voltage must be turned OFF before entering the spray area and performing any maintenance procedures. Spray booth exhaust fan(s) should remain ON while cleaning the equipment with solvents.**

**•Make sure high voltage is OFF before approaching applicator with solvent cloth.**

**•DO NOT use reclaim solvent containing d-Limonene. This can cause damage to certain plastic components.**

**•DO NOT stop bell rotation by using a rag or gloved hand against the bell cup edge.**

**CAUTION**

**•Maximum flow rate should not exceed 700 cc/min.**

•Daily removal and soaking of the bell cup may not be required if the bell cup is properly flushed. However, the frequency of the feed tube and internal motor shaft inspection indicated below under weekly maintenance can be done daily and later adjusted to weekly or as required depending on the results of the inspection.

**WARNING**

**•In the event the bell cup comes in contact with a part, that cup should be replaced before continuing to spray.**

**•Do Not place high voltage test probe on bell edge unless rotation is fully stopped.**

**NOTE**

Normally the cloth covers will not need replacement daily and could last about one week depending on application. (See “Weekly Maintenance” in the “Maintenance” section.

Refer to the “Troubleshooting Guide” in the “Maintenance” section for details on determining the causes of low or no high voltage at the bell cup.

**Weekly Maintenance (Prior to Start or End of Production Week)**

- Monitor rotational speed of all belts at the speed control. Investigate cause if abnormal.
- Monitor high voltage and current output indicated on the MicroPak display. Investigate cause if abnormal.
- Check paint flow on all bells at minimum and maximum specified settings by taking beakered readings.
- Check solvent flow by opening solvent valve and taking a beakered reading (should be within approx. 10% of target flow rate).
- Paint residue found in the shaping air holes is not acceptable and must be removed prior to applicator use (see “Cleaning Shaping Air Holes” in the “Maintenance” section).

- Remove protective cover from out housing and discard. Clean any paint on outer surface of front and rear housing with soft cloth dampened with solvent. (See "Warning" on avoiding the use of cleaning solvent containing d-Limonene).
- Remove the front shroud and check for any signs of solvent or paint leakage. Clean as required.
- Remove bell cup and soak in solvent for 1-2 hours. Clean with a soft brush as required. Remove from cleaning solution and blow dry before replacing.
- Visually inspect for signs of fluid leaks around fluid connections and manifold. Correct problem and clean paint from all components, including internal portion of shroud.
- It may be necessary to remove the bell cups for cleaning more frequently then weekly. (See Note under "Daily Maintenance" in the "Maintenance" section.)
- With bearing air off, carefully inspect the feed tube tip and clean any paint build-up that has occurred on the feed tube tip. Using a pen light, determine if there is build-up of paint in the motor shaft and/or around the paint feed tube. If so, remove the motor assembly following the disassembly procedures and clean out the inside diameter of the motor shaft using a tube brush and solvent. Clean the outer surfaces of the feed tube.
- Reinstall bell cup and front shroud, replace cover on the outer housing. (Refer to "Disassembly Procedures" in the "Maintenance" section for definite instructions.)

**CAUTION**

**•Maximum flow rate should not exceed 700 cc/min.**

**•Make sure that no solvent or other contamination is allowed to enter the motor assembly (air bearing and outer shaft).**

## BELL CUP PREVENTIVE MAINTENANCE

It is the user's responsibility to ensure proper maintenance of the atomizer bell at all times. Bell cup failure due to inadequate cleaning or handling will not be covered under the Warranty. The **"DO NOT"** bullets (see "Operator/ Maintenance Warnings" in the "Maintenance" section) listed are some examples of improper handling which could adversely affect performance or personnel safety and should not be attempted for any reason.

### Bell Cup Handling

Always verify that high voltage is turned off and the atomizer bell has stopped spinning before performing any type of handling maintenance.

## BELL CUP CLEANING - DIRECT CHARGE

Always verify that high voltage is in degrade mode of 40-50 kV and that the atomizer bell is spinning before performing any type of color change or bell flush cleaning cycle.

To reduce the risk of fire or explosion, the solvents used for exterior cleaning must have flash points above 100°F (37.8°C). Since electrostatic equipment is involved, these solvents should also be non-polar.

Solvents used for equipment flushing should have flash points equal to or higher than those of the coating material being sprayed.

## BELL CUP CLEANING - DIRECT CHARGE (Continued)

1. The atomizer bell will normally be fully cleaned during a bell flush cycle. Flushing should be done before any down time or break in production. A bell flush cycle may also be required while spraying batch parts of the same color. Verify that high voltage is in off and that the atomizer bell is spinning before flushing through the bell.
2. If there is any remaining paint build-up on any areas of the bell after flushing, the bell cup should be removed for hand cleaning. The bell's leading edge, splash plate, serration cuts, and rear of cup are some examples of areas for special attention.

**Bell Cup Soaking**

Bell cups and splash plates can be soaked in a heated solution for up to 2 hours in an ultrasonic cleaner (120°F. 49°C maximum). Bell cups alone may be soaked for an extended amount of time.

## BELL CUP CLEANING - INDIRECT CHARGE

Always verify that high voltage is OFF and that the atomizer bell is spinning before performing any type of color change or bell flush cleaning cycle.

To reduce the risk of fire or explosion, the solvents used for exterior cleaning must have flash points above 100°F (37.8°C). Since electrostatic equipment is involved, these solvents should also be non-polar.

Solvents used for equipment flushing should have flash points equal to or higher than those of the coating material being sprayed.

1. The atomizer bell will normally be fully cleaned during a bell flush cycle. Flushing should be done before any down time or break in production. A bell flush cycle may also be required while spraying batch parts of the same color. Verify that high voltage is in off and that the atomizer bell is spinning before flushing through the bell.
2. If there is any remaining paint build-up on any areas of the bell after flushing, the bell cup should be removed for hand cleaning. The bell's leading edge, splash plate, serration cuts, and rear of cup are some examples of areas for special attention.
3. Visually inspect the bell cup edge for signs of abrasion. If the edge is excessively worn or badly chipped as the result of a collision with a part, replace the cup immediately
4. Remove splash plate. Inspect for wear on the bell cup where the fluid leaves the large diameter of the splash plate. If any undercut in this area, the cup should be replaced. Also, check the three (3) pins between the front and rear splash plate halves. If worn, replace entire assembly.
5. Check the center holes of the splash plate for wear. Hold splash plate up to a light source and look straight into the holes. If light is clearly seen, the angled holes are worn and the splash plate must be replaced.
6. Splash plate assemblies may be soaked for a short time, under 2 hours, to loosen dried material. Clean with a soft bristle brush. Blow out center holes to dislodge material. Never use any kind of pick instrument to clean these holes.
7. Soaking the bell in solvent may aid in loosening or removing paint build-up. It is recommended that the splash plate be removed and cleaned separately.
8. Use a soft bristle brush dipped in solvent

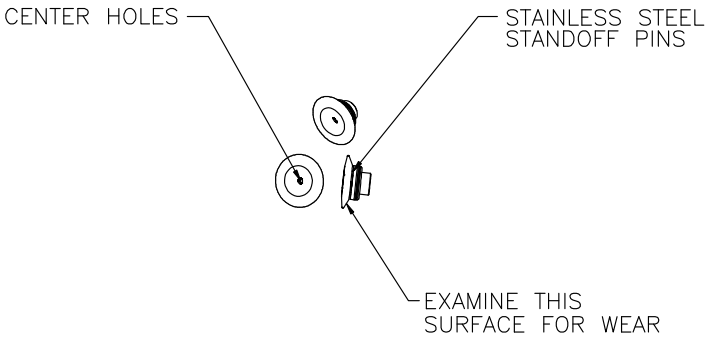
to remove paint build-up from the serration cuts, paint feed holes or slots, and external and internal surfaces of the bell.

9. Check the well cavity in the back of the bell cup. This cavity must be cleaned manually. It will not be cleaned during purge cycles or interior or exterior cup flushes.
10. A soft, lint free rag dampened with solvent may be used to remove any paint residue from the external and internal surfaces of the bell.
11. After removing all paint build-up or residue, rinse the bell in clean solvent and blow dry.
12. Before reinstalling the bell on the shaft, check the mating surfaces of the thread and taper for any paint build-up or residue. Also, check the fluid tip, fluid tube outside diameter, and the shaft for any further paint build-up. These surfaces should be cleaned before installing the bell.
13. It is recommended that extra bell cups be purchased. The cups can then be cleaned off line in an automated cup cleaner.
14. Reinstall cups to proper torque 50-70 lbs•in (5.65-7.91 Nm).

**Bell Cup Replacement**

Bell cup wear is dependent on many factors such as bell speed, flow rate, and type of coating being applied.

The bell cups shown in the photos indicates if a bell cup has some useable life or should be replaced. Photo 1 shows a bell cup that has some useable life. The grooves worn around the splash plate pins are shallow. The general appearance of the cup surface is smooth and uninterrupted. Photo 2 shows a bell cup that needs to be replaced, as well as the splash plate that was installed into the cup. The grooves are deep, a visible groove exists at the outer edge diameter of the splash plate and there are noticeable lateral grooves extending towards the outer edge of the cup.



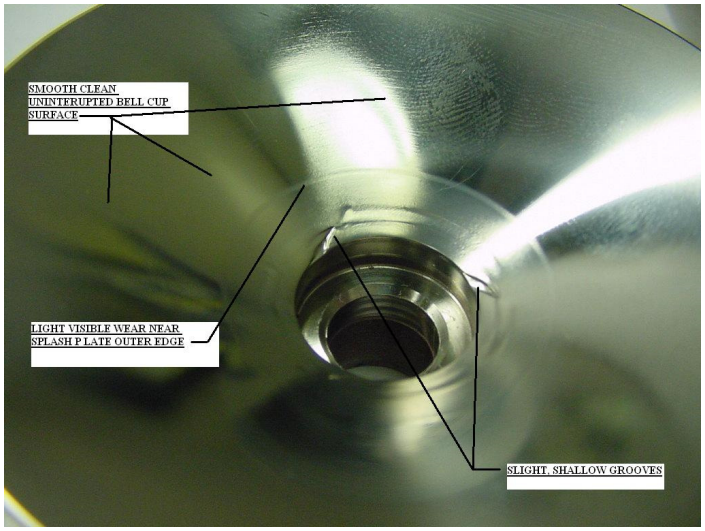




**Photo 1**

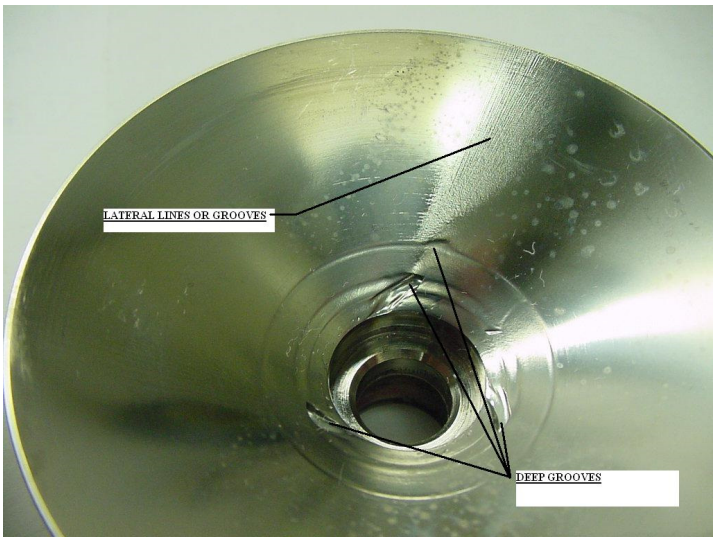



**Photo 2**

## CLEANING SHAPING AIR HOLES

In order to maintain uniform pattern control, the shaping air holes of the inner ring and the shaping air cap must be clean and free of any blockage.

It is best to leave the shaping air supply ON during normal production break cleaning periods. Shaping air can be reduced to 70 slpm during this time. This will help stop material from entering the passage ways.

Periodically (weekly) the outer shaping air cap and the inner shaping air ring should be removed and thoroughly cleaned. Use of an ultrasonic cleaner would make cleaning of hole diameters easier. Inspect all holes for blockage. Blow holes clear with compressed air after some time of soaking in solvent. **DO NOT use any type of pick to clear the holes.** Damage may result to parts and could affect performance of the equipment. If holes are damaged (oversized holes, blockage, and gauges) it must be replaced.

## MMA-303 PREVENTIVE MAINTENANCE SCHEDULE

| Frequency (Maximum) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Procedure** | **Mid-Shift** | **End of Shift** | **Weekly** | **2 Weeks** | **Monthly** | **3 Months** | **6 Months** | **Yearly** |
| Mid Shift Cleaning<br>• Wipe electrodes<br>• Wipe shroud<br>• Visually inspect cup | **X** | | | | | | | |
| End of Shift Cleaning<br>• Wipe electrodes<br>• Wipe shroud<br>• Wipe bell cup down<br>• Change cloth cover | | **X** | | | | | | |
| Shaping Air Shroud<br>• Clean inner shape air ring<br>• Clean outer shape air ring<br>• Remove and clean | **X** | **X** | **X** | | | | | |
| Bell cup removal/ inspection/ cleaning | | **X** | **X** | | | | | |
| Fluid Tip inspection/ cleaning | | **X** | **X** | | | | | |
| Inspect Valve and Seat Assembly in Valve Module for leaking | | | | **X** | | | | |
| Replace Valves and Seats in Valve Module | | | | | | | **X** | |
| High Voltage Cable Inspections | | | | **X** | **X** | | | |
| High Voltage Testing | | | | | | **X** | | |
| Regreasing of High Voltage Cables | | | | | | **X** | | |
| Check resistance of High Voltage Electrodes | | | | | | **X** | | |
| Regreasing Electrode Cavities of High Voltage Ring and High Voltage In-put | | | | | | **X** | | |
| Inspect all Screws<br>• Replace if broken<br>• Inspect for wear<br>• Tighten per specifications | | | | | **X** | | | |

## MMA-303 PREVENTIVE MAINTENANCE SCHEDULE (Continued)

| | Frequency (Maximum) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Procedure** | **Mid-Shift** | **End of Shift** | **Weekly** | **2** | **Monthly** | **3 Months** | **6 Months** | **Yearly** |
| Inspection of Electrode | | | **X** | | | | | |
| Replace Electrodes | | | | | | | **X** | |
| Inspection of Tubing Bun- | | | | | **X** | | | |
| Regrease Tubing Bundle | | | | | | | **X** | |
| Replace Tubing Bundle | | | | | | | | **X** |
| Replace High Voltage Ca- | | | | | | | | **X** |
| Inspect Turbine Spindle taper and threads | | **X** | **X** | | | | | |
| Replace Bell Cups | | | | | | **X** | **X** | **X** |
| Replace Splash Plates | | | | | | **X** | **X** | |
| Inspect and Clean Spindle Bore and Fluid Tube OD | | **X** | **X** | | | | | |
| Check High Voltage Con- area for damage/arcing | | **X** | | | | | | |
| Inspect for Fluid Leaks | **Daily** | | | | | | | |
| Check Exterior of High Voltage Ports for degrada- tion | **X** | | | | | | | |
| Check External Cup Flush Carbide Tip for blockage | **X** | **X** | | | | | | |

**N O T E**

**NOTE** - The outer protective cover may have to be replaced more frequently than weekly. Daily inspection of the amount of paint build-up on the cover will determine the frequency of replacement.

## DISASSEMBLY PROCEDURES

**N O T E**

For reassembly instructions, use the reverse of the following disassembly procedures.

To facilitate atomizer removal from hose manifold, a robot program should be made that purges all paints and solvents from the MMA-303. Ideally it would then position the bell assembly in a bell removal position where the bell cup is pointed downward at a 30° angle.

Any residual solvents would be contained in the “J bend “ of the robot wrist.

All O-rings described in the “Maintenance” section of this manual should be lubricated with a food grade petroleum jelly or with A11545 lubricant.

**W A R N I N G**

**•Prior to removing applicator from the robot, the following tasks must be completed.**

- **Robot put into E-stop mode, locked and tagged out.**
- **All fluid passages are cleaned, purged out, and depressurized.**
- **Air turned off.**

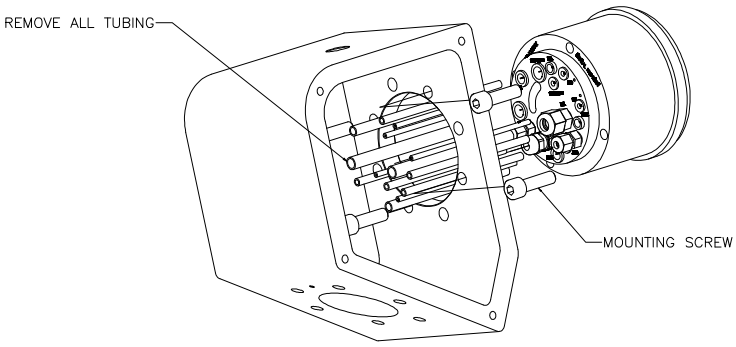
**N O T E**

Direct Charge and Indirect Charge Atomizer removal instructions are the same with the exception of removing the high voltage ring.

---

Disassembly the turbine manifold assembly from the mounting manifold assembly by unscrewing the retaining ring counter-clockwise. Use of the spanner wrench to aid in removal may be necessary.

Once the high voltage ring and turbine manifold assembly have been disassembled, remove all tube connections to the mounting manifold and remove the four (4) mounting screws.




**Atomizer Reassembly (Indirect Charge)**

Make certain the quick disconnect retaining ring is on the mounting manifold prior to installing any tubes. Install all tubing to the appropriate port in the mounting manifold. Ensure the ground cable is properly secured into the plug before tightening the compression nut.

Once the tubes are attached, secure the mounting manifold to the robot with the four (4) screws.

Align the turbine manifold assembly with the mounting manifold assembly and press firmly. A slight press-fit is typical as O-rings engage.

White standing in front of the applicator, tighten the quick disconnect retaining ring counter-clockwise. Use of the spanner wrench to aid in tightening may be necessary.

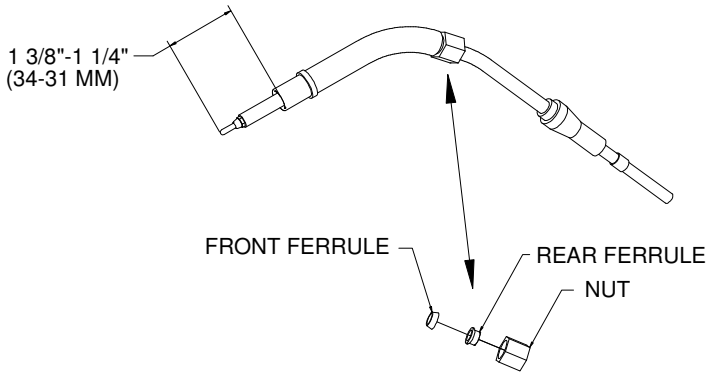
Check ground connection with an ohm meter. Connect one lead of the meter to the shaft of the air bearing spindle and the other lead to the other end of the ground cable or the earth ground source that it is connected to. Reading should be 10 ohms or less.

**NOTE** - Before installing high voltage ring, fill the cavity in the high voltage ring with dielectric grease between the input and the outer diameter (see “Atomizer Removal” figure in the “Maintenance” section).

## DISASSEMBLY PROCEDURES (Cont.)

Remove the curved high voltage tube from the high voltage ring. Slide the high voltage nut and ferrules onto the high voltage cable, then slide the curved tube over the high voltage cable. Leave assembly loose. Insert the banana jack end of the cable into the rear opening in the high voltage ring until it seats firmly. Slide the curved tube towards the high voltage ring and secure in place by tightening the large high voltage locknut (A11318-00) by hand. Ensure high voltage cable is in place before tightening high voltage nut and ferrule (78441-00) by pushing high voltage cable towards the high voltage ring. Tighten nut and ferrule securely by hand.

Proper high voltage cable installation may be verified by checking probe resistance from electrodes to the end of the high voltage cable per the use of an Yakogawa megohm meter or equivalent. Attach one lead to the end of the high voltage cable and touch the other end to the wire at the tip of each electrode, one at a time. The reading should be 152-168 megohms. If not, recheck connection in the high voltage ring.




**78441-00 Ferrule Orientation**

**High Voltage Ring Removal / Replacement (Indirect Charge)**

Loosen the high voltage locknut (A11318-00) and pull curved tube from back of high voltage ring. Grasp the high voltage ring and turn counter-clockwise approximately 10-15”until locking pins disengage. Pull ring forward to remove.

To reassemble, ensure O-ring on inside diameter and on face of atomizer extension are seated properly in their grooves. Lightly lubricate both O-rings with A11545-00 Petrolatum Jell. Slide high voltage ring onto atomizer body making sure high voltage input is located at the top of the unit. Push firmly until it stops against the atomizer extension and is engaged on the locking pins. Rotate high voltage ring clockwise 10-15° to lock ring into place. Some force may be required with a new ring, but a solid lock will be felt when properly installed.

**N O T E**

Before installing high voltage ring, fill the cavity in the high voltage ring between the input and the outer diameter with dielectric grease (see “Atomizer Removal” figure in the “Maintenance” section).

Before installing the curved tube, ensure the outer ring of the high voltage input is filled with new dielectric grease. Reinstall high voltage cable and curved tube and tighten locknut securely by hand. Proper high voltage cable installation can be verified by checking probe resistance from the electrodes to the end of the high voltage cable per use of a Yakogawa megohm meter or equivalent. Attach one lead to the end of the high voltage cable and touch the other end to the wire at the tip of each electrode, one at a time. The reading should

be 209-231 megohms for use at sea level. If not, recheck connection in the high voltage ring.

**Atomizer Reassembly (Direct Charge)**

Make certain the retaining ring is on the mounting manifold prior to installing any tubes. Install all tubing to the appropriate port in the mounting manifold. Ensure the high voltage cable is properly secured into the plug before tightening the compression nut.

Once the tubes are attached, secure the mounting manifold to the robot with the four (4) screws.

Align the turbine manifold assembly with the mounting manifold assembly and press firmly. A slight press-fit is typical as O-rings engage.

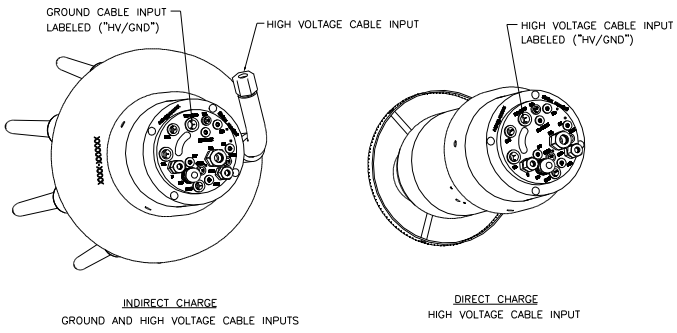
While standing in front of applicator tighten the retaining ring counter-clockwise. Use of the spanner wrench to aid in tightening may be necessary.

**High Voltage Cable Installation**

***Direct Charge*** - Insert the high voltage cable into the hole labeled “HV/GND” on the rear of the mounting manifold until it bottoms into the banana jack receptacle. To remove, push on the black collet with your fingers or the tube removal tool (A11373-00). When fully depressed, pull the cable out.

***Indirect Charge*** - Insert the high voltage cable into the curved tube of the high voltage ring as shown in “High Voltage Cable Installation” figure.

Insert the ground cable into the hole labeled “HV/GND” on the rear of the mounting manifold until it bottoms into the banana jack receptacle. To remove, push on the black collet with your fingers or the tube removal tool (A11373-00). When fully depressed, pull cable out.




**N O T E**

Direct charge option 78152-00 high voltage splitter will allow up to four (4) atomizers to operate at the same voltage from one 74593-XX cascade and controller. The splitter will thread directly onto the cascade output tube. The high voltage cable will then insert into any of the splitter block outlets. Any port that is unused must be plugged. Attach ground wire from the shield to a known good earth ground source.

**HIGH VOLTAGE AND GROUND CONNECTIONS FOR SHIELDED / NON-METALLIC CORE CABLE A10560-XX**

**N O T E**

Remove bent tube (A11317-00) and high voltage locknut (A11318-00) to ensure all grooves are filled with dielectric grease before cable installation (see “78441-00 Ferrule Orientation” figure or “Atomizer Removal” figure). Remove and clean any excess grease after assembly.

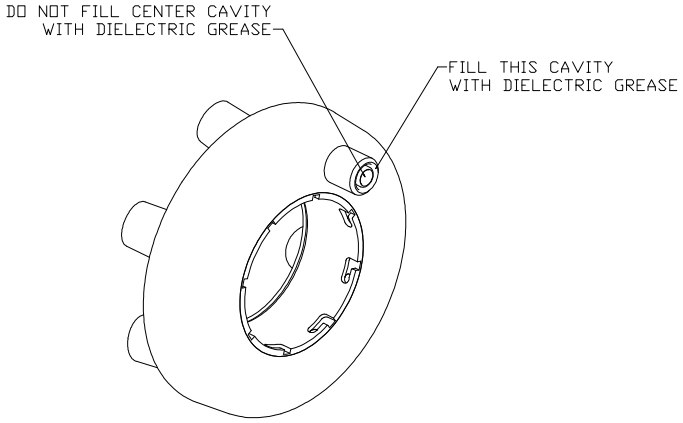
**High Voltage Connection - Cascade End**

Insert end of cable (end of cable with the green grounding wire attached) thru compression nut of output tube of RansPak™ Cascade (74793-01) until it bottoms into banana jack receptacle. Tighten compression nut by hand,

## DISASSEMBLY PROCEDURES (Cont.)

then tighten 1/2 turn more with a wrench. **DO NOT** over-tighten as this may damage cable.

Secure green wire with yellow stripe (attached to high voltage cable) to any known good earth ground, such as a water pipe, etc., using the attached ring terminal.



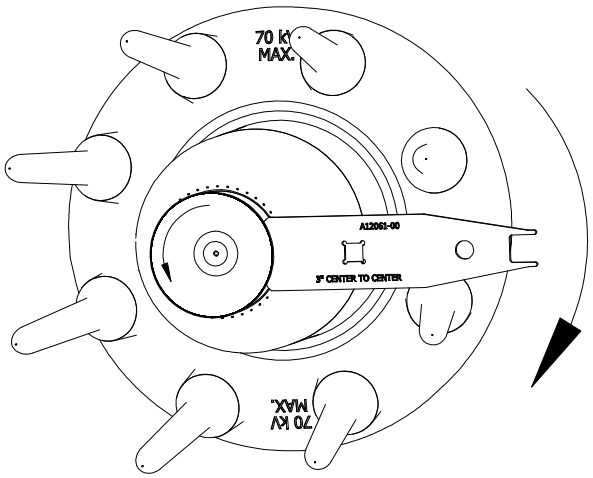

**Atomizer Removal**

### Bell Cup Removal / Replacement

**N O T E**

The bell cup should always be the first component removed if any maintenance is performed. Following the procedure will minimize the risk of damage to the cup itself.

Lay the applicator on its side of a clean and secure area, preferably an area where regular maintenance is performed. Using the large open end of the ball cup/combo wrench (A12601-00) on the flats of the turbine shaft, carefully hold the outside of the bell cup with one hand while applying a clockwise force to the wrench. The bell cup is a right hand thread and must be turned counter-clockwise to remove.




**Bell Cup Removal**

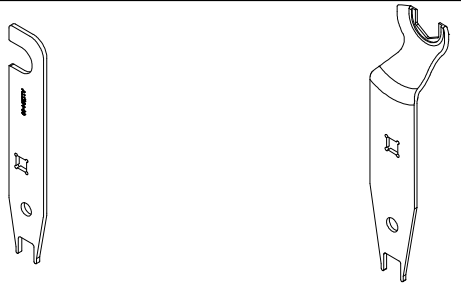
Place the bell cup in a safe, secure place. Carefully inspect the cup for any damage. If there is any damage to the cup, it must be replaced.

**C A U T I O N**

**•Failure to replace a damaged bell cup will cause premature turbine failure. Warranty will not be honored if the bell cup is damaged.**

**N O T E**

For removal of the 30mm or 55mm bell cups, you must use bell cup wrench A11284-00. For the 65mm bell cups you must use AA12061-00 bell cup wrench.

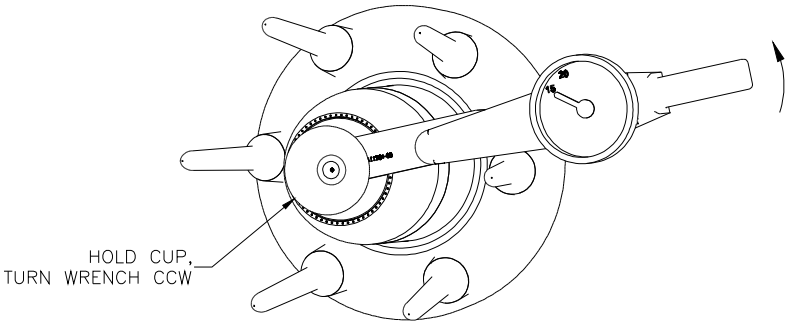


A11284-00 BELL CUP WRENCH
USE ON 30M AND 55MM BELL CUPS ONLY

A12061-00 BELL CUP WRENCH
USE ON 65MM BELL CUPS ONLY

**Bell Cup Wrenches**

To reinstall a cup, position the wrench as shown. Insert a torque wrench into the square in the wrench to approximately 50-60 lbs•in (5.65-7.9 Nm) torque. Hold the cup and tighten the torque wrench in a counter-clockwise direction. **NOTE** - True torque.




**Bell Cup Installation**

**N O T E**

There is a 3-inch center-to-center distance between the bell cup and the 3/8-inch socket square on the wrench. This distance must be factored in when reading the proper torque on the wrench.

Example: A desired true torque is desired using a 9-inch effective length torque wrench. Wrench offset is 3-inches.

L = 9-inches

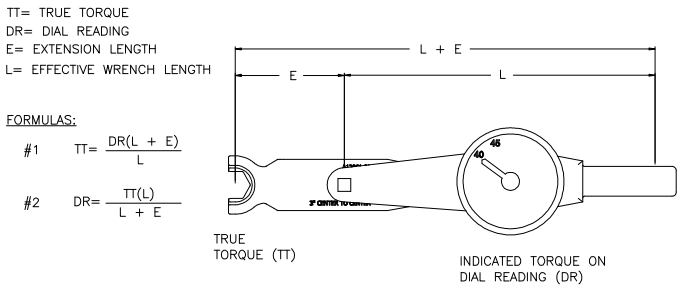
TT = 50lbs•in

E = 3-inches

DR = is dial reading.

**DR =$\frac{50\ (9)}{(9+3)}$**

**DR =37.5 lbs•in**




**Effective Length Torque Wrench**

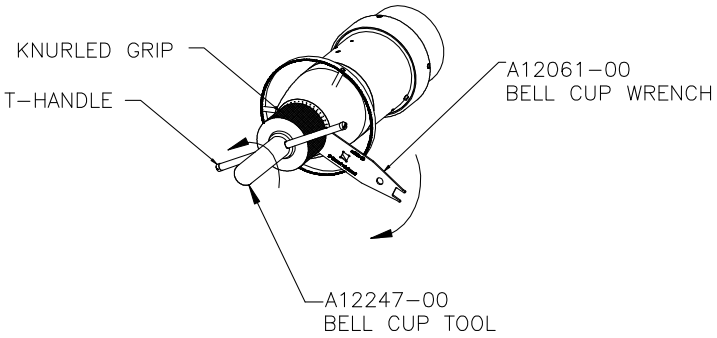
**Bell Cup Removal Tool A12247-00 (65mm Bell Cups Only) (Optional Accessory)**

This tool is meant to aid in the removal of bell cups that are abnormally tight on the spindle shaft. Typically, bell cups are easily removed by hand with the aid of the standard bell cup wrench (A12061-00). To prevent bell cups from becoming difficult to remove, care should be taken to remove wet or old dried paint from shaft and bell cup taper and threads before bell cups are assembled to the atomizer.

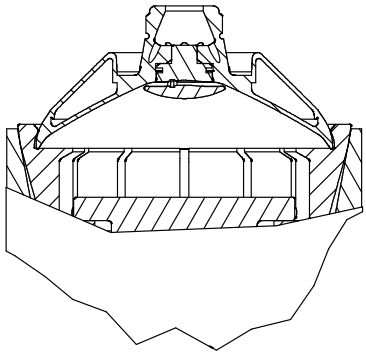
Before using the bell cup removal tool, clean the exterior of the bell cup with clean solvent and dry it. This will improve the tool's ability to grip the cups surface.

To install the tool, first engage the bell cup wrench (A12061-00) to the shaft hex behind the bell cup. Place the bell cup tool (A12247-00) over the front of the bell cup and tighten the knurled portion in a counter-clockwise direction until very tight (left hand thread). (See "Tool/Bell Cup Engagement" figure for proper engagement of tool on bell cup.) While holding the bell cup wrench on the spindle shaft, grasp the T-handle on the bell cup tool and turn in a counter-clockwise direction until bell cup is loosened. If tool rotates or slips, tighten tool further and retry.

## DISASSEMBLY PROCEDURES (Cont.)

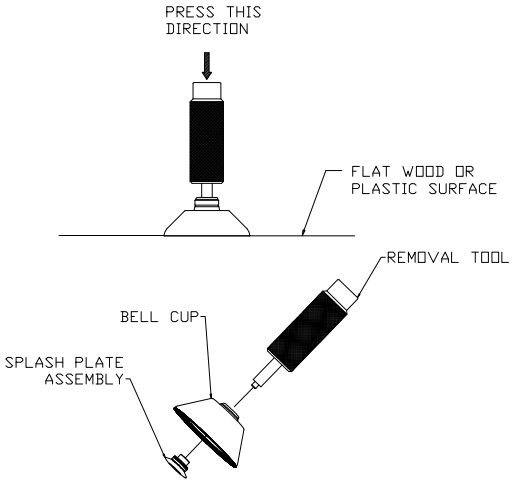



**Tool/Bell Cup Engagement**



### Splash Plate Removal

After removing the bell cup from the applicator, put it on a plastic or wood surface to prevent damage to the edge of the cup. Using the splash plate removal tool (A11388-00), insert the small end of the tool into the end of the splash plate assembly. Press the splash plate out. It may be necessary to tap lightly with a hammer.

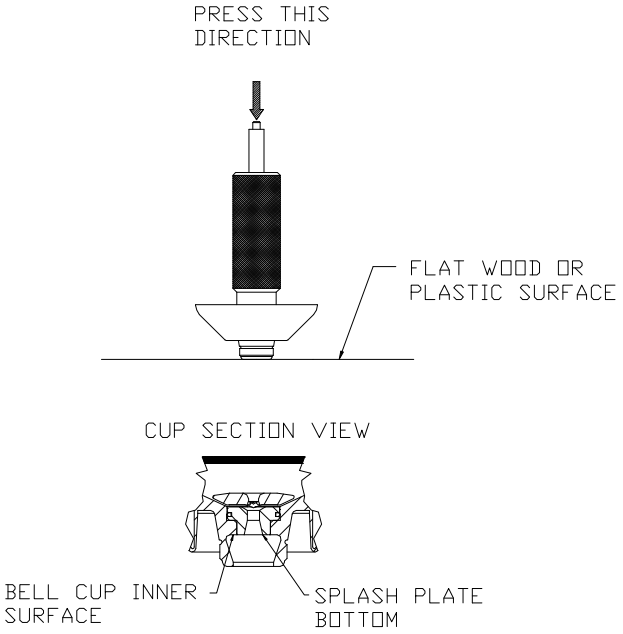



**CAUTION**

**•Failure to replace a damaged bell cup will cause vibration of the applicator and/or premature turbine failure.**

### Splash Plate Insertion (55mm and 65mm Bell Cups)

Turn the splash plate removal tool over and use the large diameter end to press the splash plate back in place by hand. It may be necessary on occasions to use an arbor press to install the splash plate. Press splash plate to a hard stop (see “Splash Plate Insertion” figure).



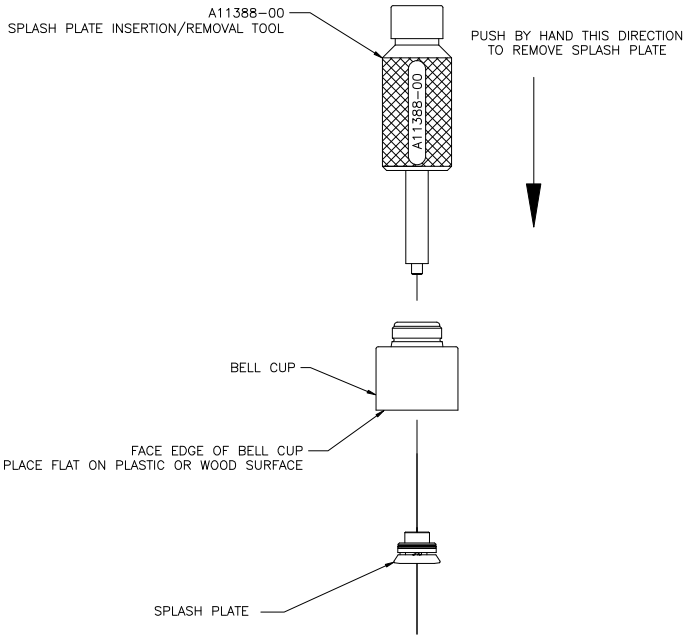

**Splash Plate Insertion**

### A11968-01/02 Bell Cup and Splash Plate Assembly

### Splash Plate Removal

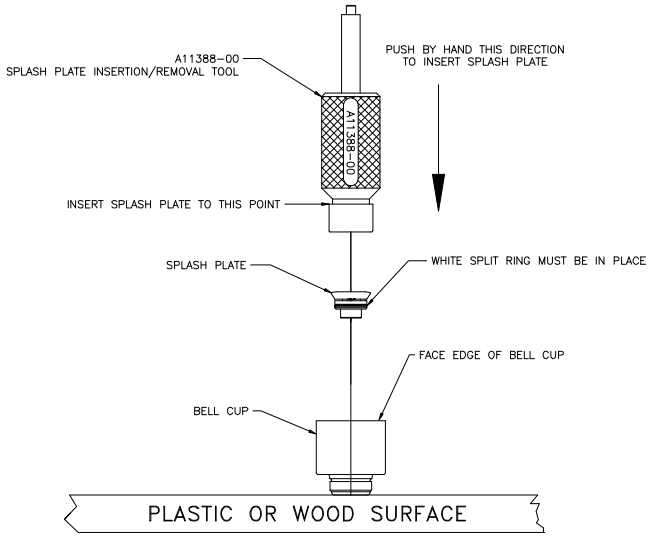
After removing the bell cup from the applicator, put it on a plastic or wood surface to prevent damage to the edge of the cup. Using the

splash plate removal tool (A11388-00), insert the small end of the tool into the end of the splash plate assembly. Press the splash plate out. It may be necessary to tap lightly with a hammer.




### Splash Plate Insertion

Turn the splash plate removal tool over and use the large diameter end to press the splash plate back in place by hand. It may be necessary on occasions to use an arbor press to install the splash plate. Press splash plate to a hard stop. Face of bell cup should line up with undercut as shown on tool (see “Splash Plate Insertion” figure).




## A11588 ATOMIZER MANIFOLD (MMA-303) CUP WASH TUBE DISASSEMBLY / ASSEMBLY INSTRUCTIONS

### To Remove Old Tubing

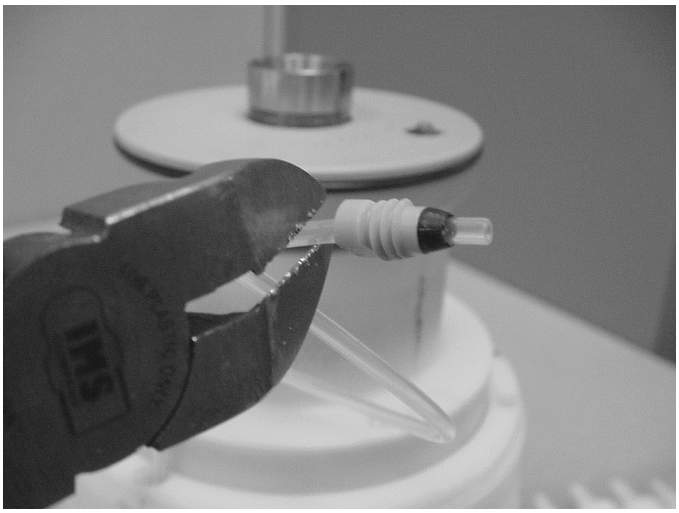
If damage has occurred to the cup wash tubing line and it has to be removed, first unthread the fitting from the shaping air manifold at the front of the applicator body. Cut the tubing right behind the fitting (see “Removal of Old Tubing” figure). The fitting can be reused in most cases but the ferrule must be replaced.

Remove the fitting at the rear of the applicator with the A11229-00 tool. Insert the prongs of the tool into the fitting and unscrew counterclockwise (reference “Tighten Fitting Into Manifold” figure, “Tighten Fitting Into Manifold” figure, and “Face of Fitting Flush with Manifold” figure in this section).

At the front of the applicator, pull out the tubing. Pull hard until the tubing pulls free of the ferrule that holds onto it in the rear of the manifold. The tubing will stretch until it breaks free of the ferrule. Using a 2.2mm rod, insert the

## DISASSEMBLY PROCEDURES (Cont.)

rod into the front hole of the atomizer body where the cup wash tube exits and push out the rear ferrule in the atomizer body (see "Rear Ferrule Removal" figure). Tap lightly if required to remove ferrule.

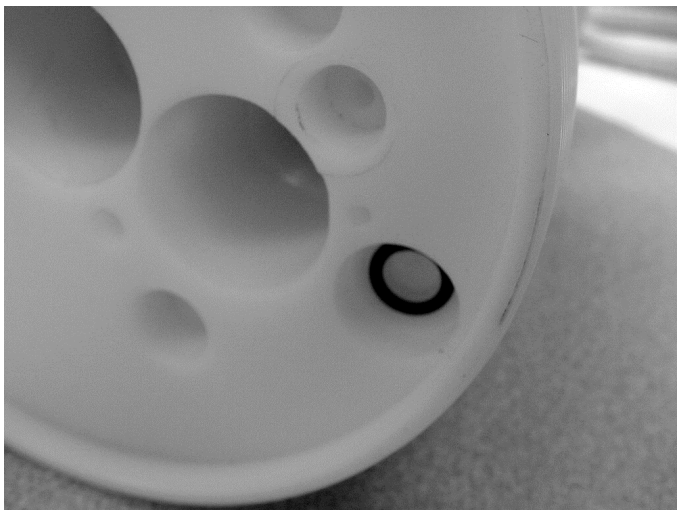


**Removal of Old Tubing**

**Rear Ferrule Removal**

**To Replace Cup Wash Tubing**

Install O-ring into manifold as shown in "Install O-Ring Into Manifold" figure. Using petrolatum jell on the O-ring will help hold it into place during assembly.



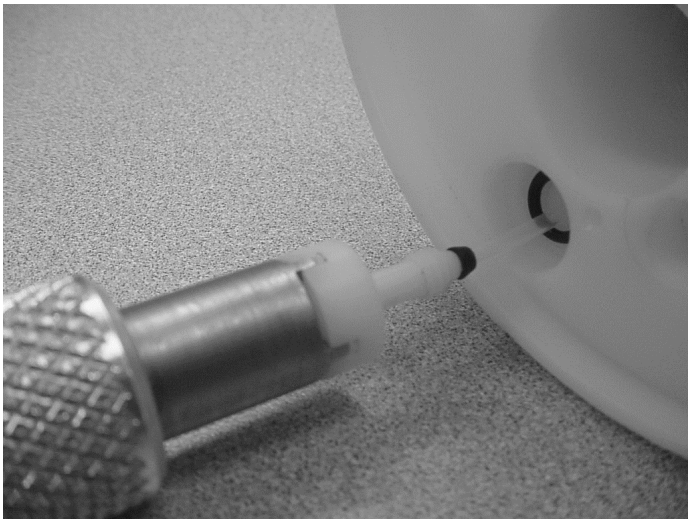
**Install O-Ring Into Manifold**

Slide ferrule (A11305-00) onto tubing with tapered end first as shown in " Slide Ferrule Onto Tubing" figure. Install tubing into cup wash with fitting (A11276-00) as shown in " Fitting Tool Fully Engaged" figure. Tubing should insert into fitting approximately 0.25-0.31-inches (6-8mm).

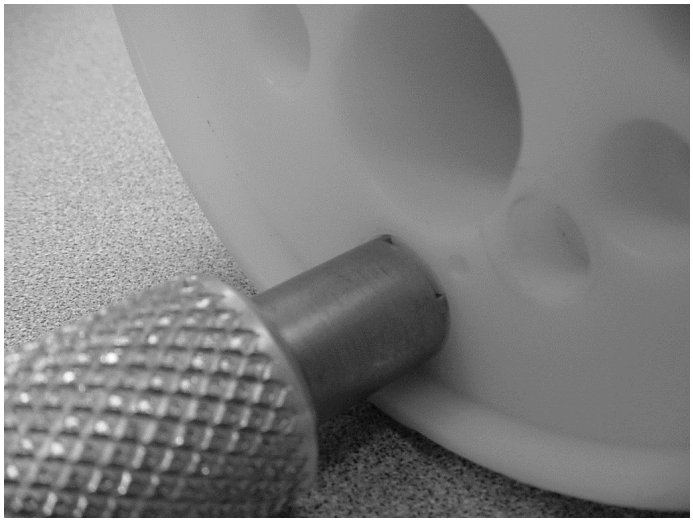
**Slide Ferrule Onto Tubing**

**Fitting Tool Fully Engaged**

Gently slide the tubing into the manifold until the thread of the fitting can be engaged in the manifold. With the fitting tool fully engaged into the slots of the fitting, tighten the fitting into the manifold until the face of the fitting is flush with the manifold. (See “Tighten Fitting Into Manifold” figures and “Face of Fitting Flush with Manifold” figure.)



**Tighten Fitting Into Manifold**

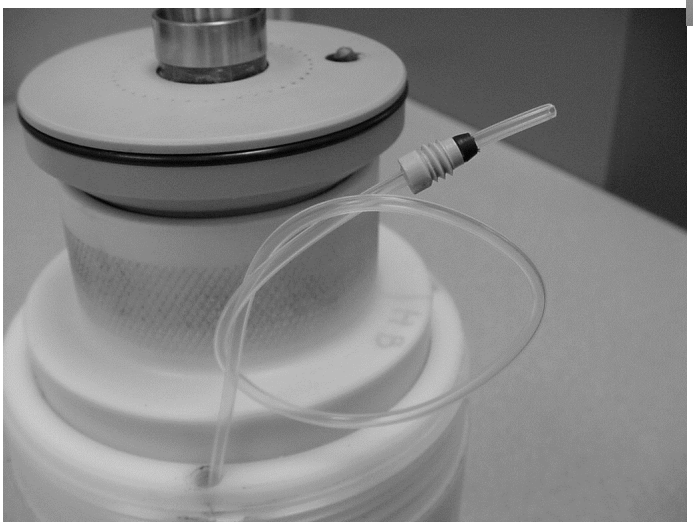


**Tighten Fitting Into Manifold**

**Face of Fitting Flush with Manifold**

## DISASSEMBLY PROCEDURES (Cont.)

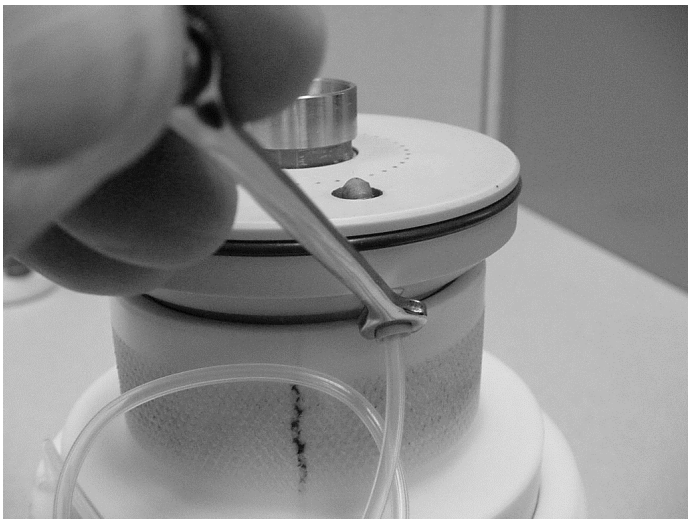
At the front of the atomizer, examine where the tube is in relationship to the fitting hole location of the shaping air manifold. If it is 90° or less than where the tube exits the atomizer body, you must install a loop in the tubing as shown in "Installing Loop In Tubing" figure. Do not kink tubing. Slide nut (A11276-00) and ferrule (A11305-00) over the end of the tube as shown.



**Installing Loop In Tubing**

Insert end of tube into hole of shaping air manifold. Slide ferrule and fitting forward and engage threads by hand until thread stops. Tighten fitting using a 3/8-inch end wrench. Tighten approximately 1/2 turn more (see "Inserting Tube" figures). Make sure tubing will not be pinched or kinked when outer shroud ins installed (see "Inserting Tube" figures).

**Inserting Tube**



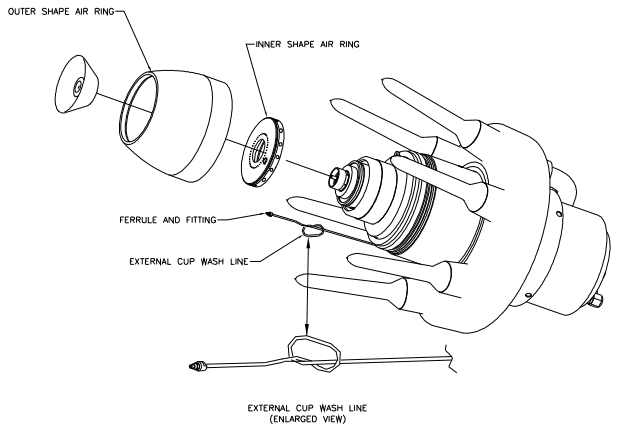
**Inserting Tube**

**Inserting Tube**

### Shaping Air Manifold, Solvent Tube Removal/Replacement

#### *Removal*

Remove the outer shaping air ring by turning if off by hand in a counter-clockwise direction. Remove the fitting, ferrule, and exterior cup wash line from the inner shaping air manifold by turning the fitting in a counter-clockwise direction using a 3/16" end wrench. Loosen set screw on inner shaping air manifold with a 5/64" hex wrench enough to allow manifold to be removed from the turbine body. Remove the inner shaping air manifold by turning it off in a counter-clockwise direction. A 1/4-20 threaded screw may be screwed into the cup wash port to provide additional leverage to remove the inner shaping air ring.




55MM STYLE SHOWN (REF.)

### Interior/Exterior Shaping Air Manifold Removal

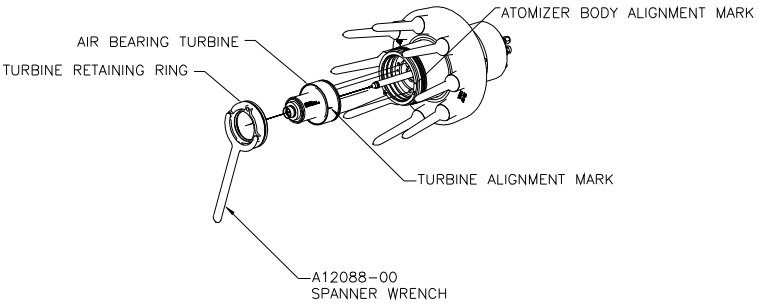
#### Reassembly

(Lightly lubricate all O-rings prior to assembling.) Carefully install the inner shaping air ring onto the turbine threads. Tighten in a clockwise direction until it seats against the turbine. Tighten set screw to 5 lbs•in (0.564 Nm) torque to prevent shaping air ring/manifold from rotating. Do not over-tighten! If replacing the solvent tube, install into the atomizer body first and tighten with a 3/16” end-wrench. Before installing the other end into the inner shaping air ring, check the position of the 1/4-20 threaded hole. If it is less than 180° from the fitting installed in the atomizer body, you must install a loop (as shown in “Installing Loop In Tubing” figure) to prevent tube from becoming pinched when outer shaping air ring is installed. Do not kink the tube when installing loop (see “Interior/Exterior Shaping Air Manifold Removal” figure).

### Turbine Removal/Replacement

#### Removal

Remove the turbine retaining ring by using the spanner wrench (A12088-00), turning the turbine retaining ring in a counter-clockwise direction. Pull the turbine out while rocking it from side to side.




**Turbine Removal**

## DISASSEMBLY PROCEDURES (Cont.)

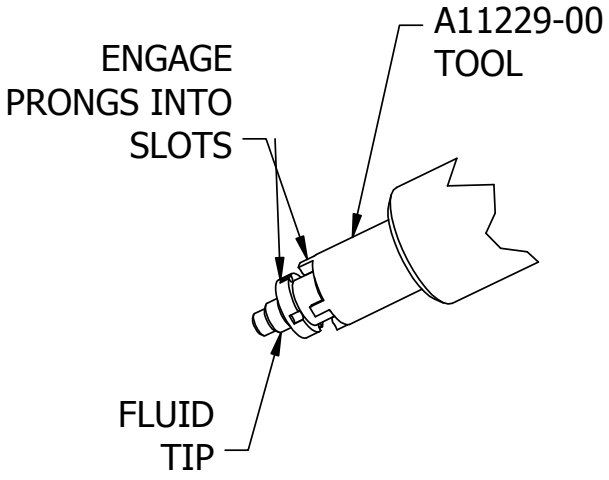
### Replacement

Apply a light coating of O-ring lubricant to all the O-rings and the threads of the turbine and turbine retaining ring prior to assembly. Push the turbine down into the cavity in the atomizer body. Align the mark on the turbine with the mark on the atomizer body. Install the turbine retaining ring and o-ring by hand. Use the spanner wrench to tighten an additional 1/8-1/4 turn. (Lightly lubricate O-ring with petroleum jelly.) Check centering of fluid tube. If fluid tube is centered, the turbine is fully seated. If not, check tightness with spanner wrench. If tube is not centered, again remove turbine and check for causes, such as an O-ring fell off, fiber optic not fully installed, foreign material on seating surface, etc. Reinstall and recheck tube centering.

### Fluid Tip Removal / Replacement

### Removal

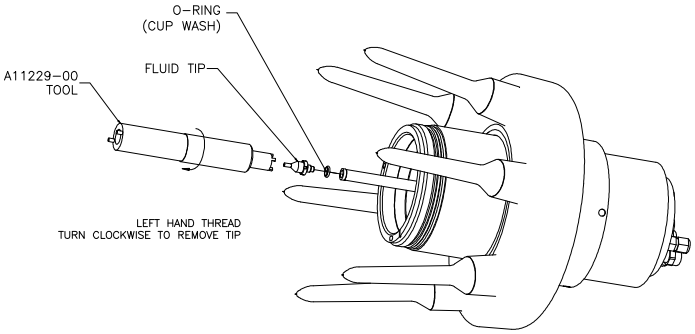
To remove the fluid tips, use the tip/tube removal tool (A11229-00). Insert the tool over the tip and engage the four (4) prongs of the tool into the four (4) slots in the tips (see “Fluid Tip Removal” figure).




**Fluid Tip Removal**

**N O T E**

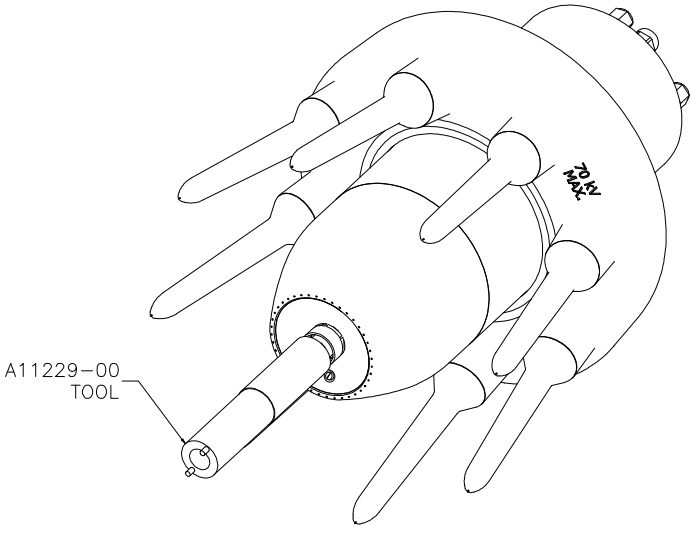
To remove, turn the tip **CLOCKWISE.** The thread on the tip is **left hand.**




**Fluid Tip**

The fluid tip may be removed either with the turbine in place, or the turbine off the unit. “Fluid Tip Removal” figure shows removing the tip with the turbine in place.

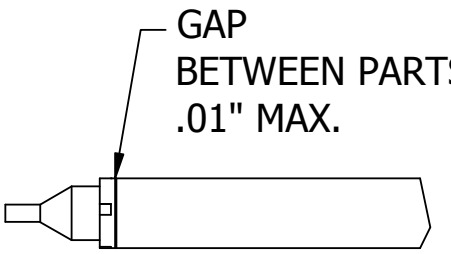
This allows removal and replacement of the fluid tip while the applicator is on line.




**Fluid Tip Removal**

Replacement

**Ensure the tip openings are fully open and clean. Apply an O-ring lubricant to the O-ring to help hold it in place on the fluid tip. Insert the O-ring into the undercut groove on the tip. Place the tip on the tool and tighten in a counter-clockwise** direction into the fluid tube. **Do not over-tighten**. There will be a small gap between the flange of the fluid tip and the fluid tube (see "Fluid Tip/Tube Gap" figure). Ensure the O-ring is properly positioned when complete. Tighten to 25-30 lbs•in (2.83-3.4 Nm)




**Fluid Tip / Tube Gap**

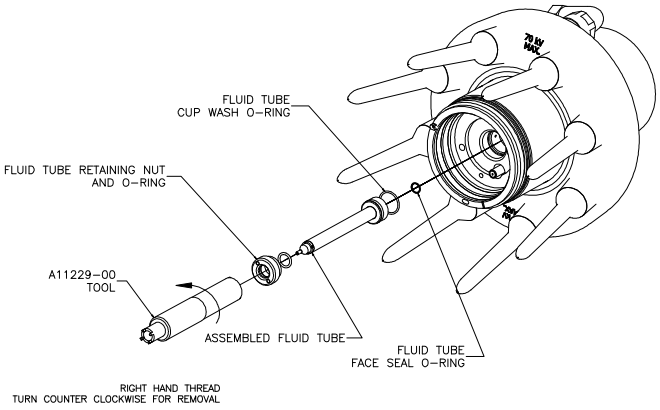
**WARNING**

**•When removing fluid tip while turbine is still installed, make sure to clean paint or fluid that may leak and run onto the shaft or threads.**

**Fluid Tube Removal / Replacement**

**Removal (Turbine Removed)**

Using the fluid tip/tube removal tool (A11229-00), place the pinned end of the tool towards the fluid tube retaining nut and engage the pins into the holes. Turn the tool counter-clockwise to remove (see "Fluid Tube Removal" figure).



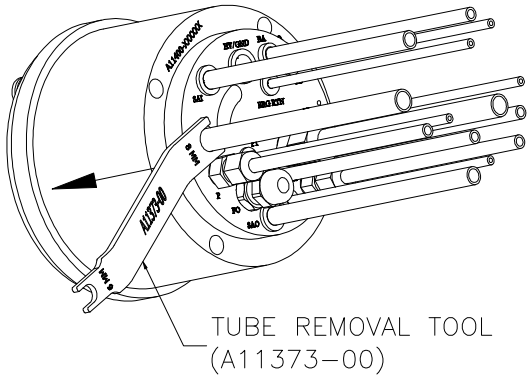

**Fluid Tube Removal**

***Replacement***

Lubricate all O-rings with A11545-00 O-ring lubricant. Push the fluid tube into the pocket of the atomizer body. Seat the tube by pushing while rocking the tube from side to side. Install the fluid tube retaining nut over the tube. Tighten the retaining nut firmly tight using the removal tool in a clockwise direction. Tighten to 65-75 lbs•in (7.34-8.47 Nm) torque.

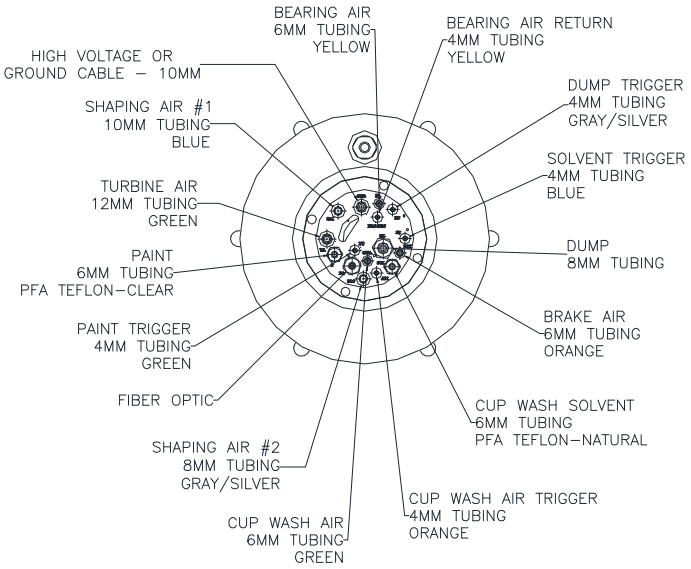
**Tubing Removal (Mounting End)**

Using the tubing removal tool (A11373-00) select the appropriate size end for the tube you want to remove, 8mm or 6mm. Place the opening around the tube and press down on the quick release collet. Using your other hand, pull the tubing from the collet. Remove all tubing from the collets and also remove the fluid lines held on with compression nuts.

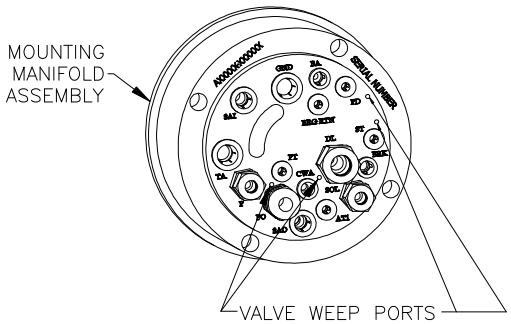



**Fluid Tube Removal**

## DISASSEMBLY PROCEDURES (Cont.)



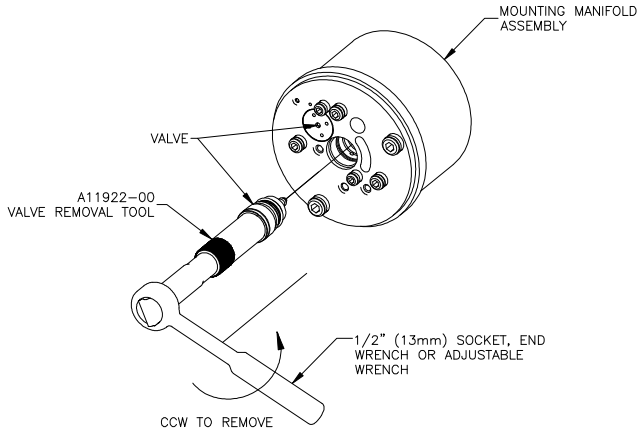

**Valve and Seat Removal / Installation (Mounting Manifold Assembly)**




**Weep Port Locations**

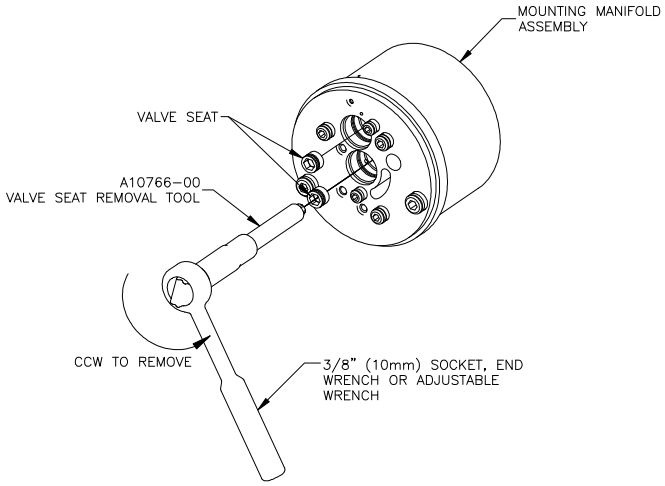
Inspect weep ports for contamination or other visible leakage around valves. Follow instructions as follows for damage to valves, seats, or performing preventative maintenance.

Using the valve removal tool (A11922-00), 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.




**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.




**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.

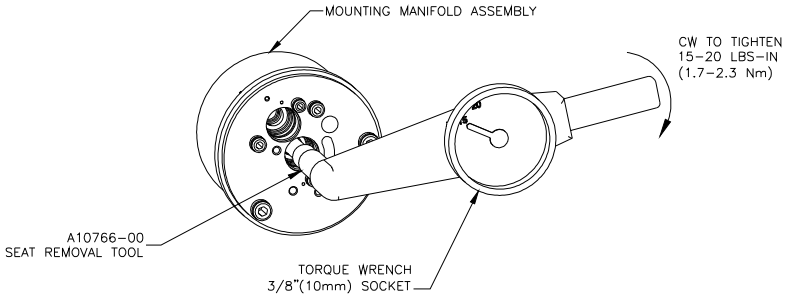
***Replacement***

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.

**N O T E**

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

Hand tighten the seat in place. Using a /8" (10mm) socket, torque the valve seats to 15-20 lbs•in (1.7-2.3 Nm).

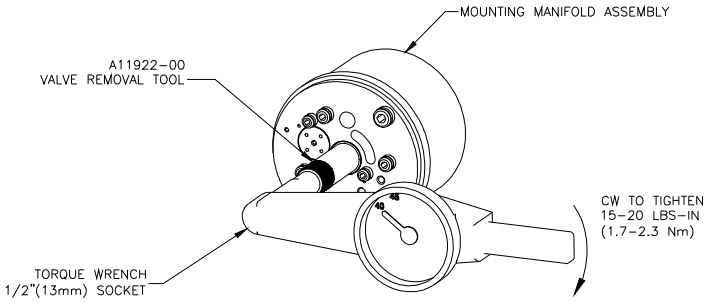



**Valve Seat Torque**

**! C A U T I O N**

**•Always use a torque wrench to torque the seats in place. Over-torqueing 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) after valve is down.




**Valve Torque**

**Valve and Seat Removal (Turbine Manifold Assembly) ("Valve Extraction" Figures)**

**Removal**

Using the valve removal tool (A11922-00), engage the four (4) pins on the tool to the corresponding four (4) hole pattern in the top of the valve. Tighten knurled thumb screw and tool to engage 1-2 threads on the valve cap. This will aid in pulling the valve from its bore once it is loose.

Using a 1/2" (13mm) socket, remove the valve by turning clockwise until fully unthreaded. Pull the valve assembly from the pocket. Pull valve straight out.

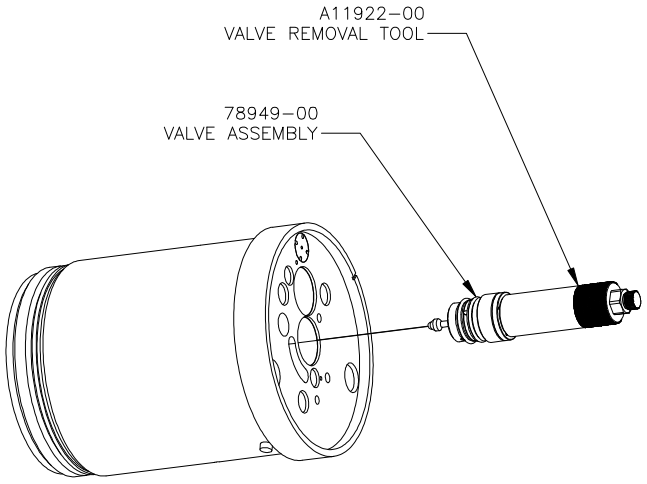
Using seat removal tool (A10766-00), insert the small hex end into the valve cavity to engage the seat hex. Using a 3/8" (10mm) socket, remove the seat by turning counter-clockwise.

**Replacement**

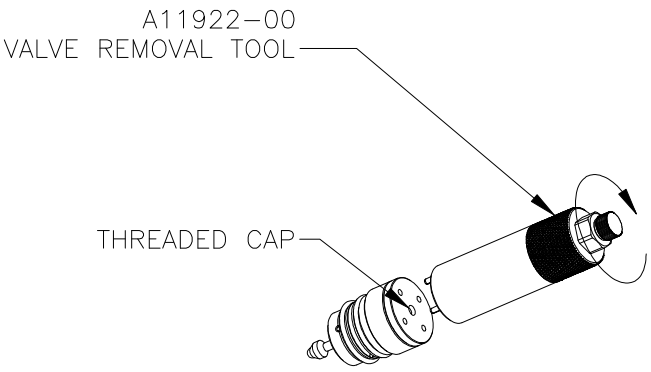
Clean seat and valve pocket thoroughly. Lubricate valve pocket, O-rings on seat, and valve assemblies with A11545-00 lubricant. Carefully start the seat assembly into the valve pocket. Hand tighten in place. Using a torque wrench with a 3/8" (10mm) socket, torque the valve seat to 15-20 lbs•in (1.73-2.3 Nm). Next place the valve onto the four (4) prongs of the valve removal tool and insert into the valve pocket. Tighten by hand as far as possible.

## DISASSEMBLY PROCEDURES (Cont.)

Tighten fully using a torque wrench with a 1/2” (13mm) socket and torque to 15-20 lbs•in (1.7-2.3 Nm) after valve is down.




**Valve Extraction**



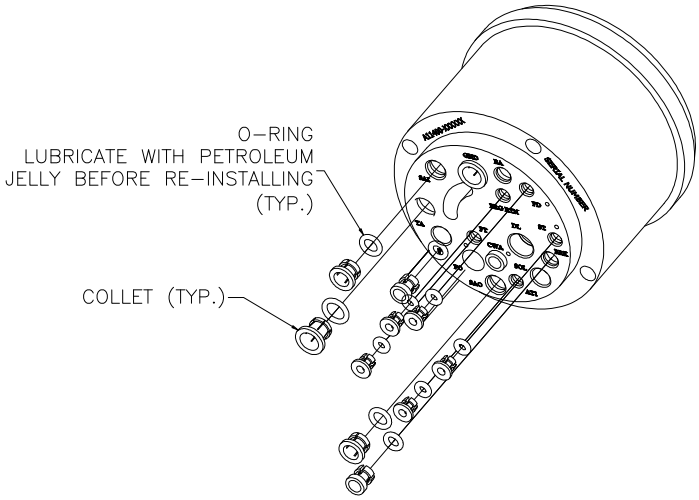

**Valve Extraction**

### QUICK RELEASE COLLET REMOVAL AND REPLACEMENT (Mounting Manifold Assembly)

If collet or O-rings become damaged, they can be removed and replaced. To remove the collet, use a flat blade screwdriver or needle nose pliers. If using the screwdriver, lift collet with fingers and place screwdriver blade under the head. Pry up in several places if necessary until removed. If using the pliers, grasp the head between the inside and outside diameter and pull straight out or by pulling with a rocking motion.

Remove the O-ring with a **plastic** pick device. Do not scratch or nick the sealing surfaces.

To replace O-ring and collet, lubricate the O-ring with petroleum jelly and insert into hole and make sure it lies flat on its seating surface. Align the collet with the hole and push straight in. Some collets are tighter than others by design and may require a rocking motion while pushing.




**Fiber Optic Cable Removal/Replacement**

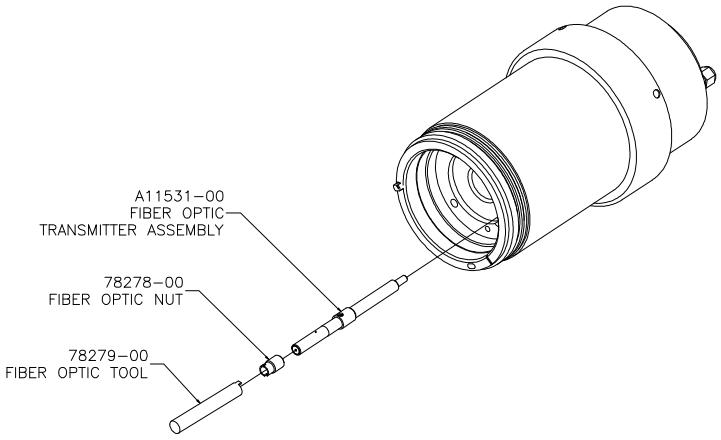
**Removal**

Remove the fiber optic nut and fitting from the knuckle. Loosen the fiber optic transmitter using the removal tool (78279-00) on the fiber optic nut. Push while twisting on the fiber optic cable from the cascade side of the knuckle until the connector nut (black) of the transmitter is visible. Loosen the connection nut and pull the fiber optic cable out of the

cascade side of the knuckle.

**Replacement**

Slide the entire assembly back into the atomizer body. Slide fiber optic nut over transmitter and tighten securely with fiber optic transmitter tool (78279-00). Feel transmitter after installation. It should not be loose when properly installed.




**Turbine O-Ring Replacement ("A11534-01 Turbine O-Ring Kit" figure)**

Remove air bearing turbine from the atomizer.

Remove all exterior O-rings.

Lightly lubricate all O-rings with A11545 Petrolatum Jell before reinstalling.

O-Ring Kit A11534-01 contains all required O-rings for replacement.

**CHECKING PROBES**

Check atomizer voltage using the Ransburg Test Meter Kit (76652-01 or 76652-04). Verify that the output voltages have not varied much from the setup standard. A drastic change in voltage can be an early indicator of a component or system problem. The data shown was collected under the ideal lab conditions using a clean atomizer and an unloaded fluid delivery system.

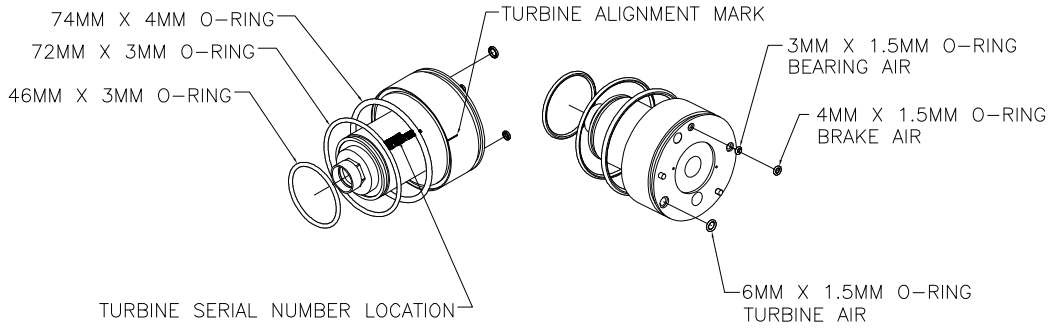
The following data is for use with the MMA-303. The output voltage measured at the bell will normally range between 91% and 97% of the kV set-point displayed at the control unit. Typical setting for spraying is 70 kV.

**High Voltage Ring Inspection**

Examine entire ring for burning marks indicated by melted plastic or blackened areas around or near where the electrodes are located, the area where the high voltage input tube is, and on the inner diameter of the ring.

If any area is found with the above conditions, the ring must be replaced.

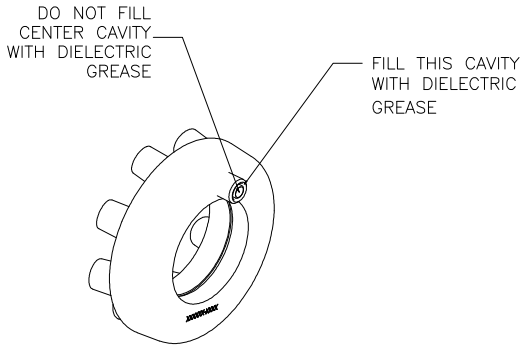
After verifying, clean all old dielectric grease from the eight (8) protrusions on the front of the ring and from the concentric circles at the high voltage input protrusion.




A11534-01 O-RING KIT CONTAINS ALL
6 O-RINGS FOR REPLACEMENT

**CHECKING PROBES (Continued)**

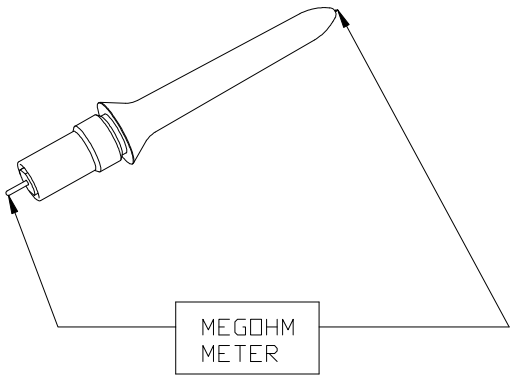
Re-apply dielectric grease (LSCH0009) to both of these areas. The eight (8) protrusions only require a thin film of grease. The high voltage input area must be filled with grease allowing no air voids. Excess grease will be squeezed out when the input tube and high voltage cable are installed. Wipe off all excess grease.




**High Voltage Ring Lubrication**

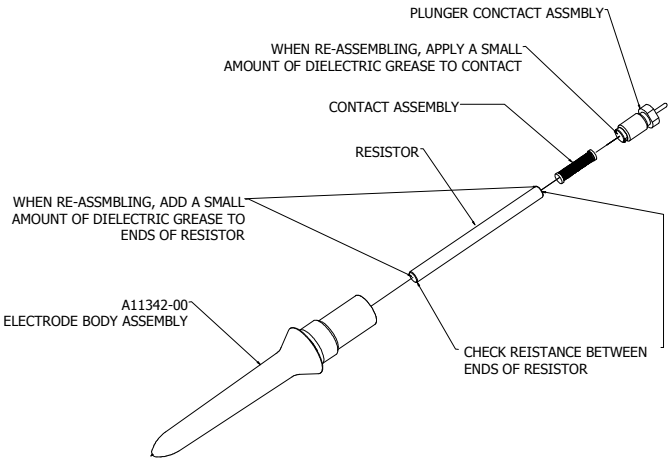
**ELECTRODE RESISTANCE TEST**

To verify that all indirect charge electrodes are functioning, place one lead of a Yokogama megohm meter or equivalent to the metal contact at the base of the electrode and the other end to the small metal wire at the tip of the electrode. Refer to the "Electrode Assembly Resistance Reading" chart for the proper resistance reading for the electrode assembly.




| ELECTRODE ASSEMBLY RESISTANCE READING | | |
|---|---|---|
| **Part #** | **Resistance Reading (Megohms)** | **Used At (Locations)** |
| A11343-02 | 209-231 | Sea Level |
| A11343-03 | 129-151 | Above 5,000 ft. |

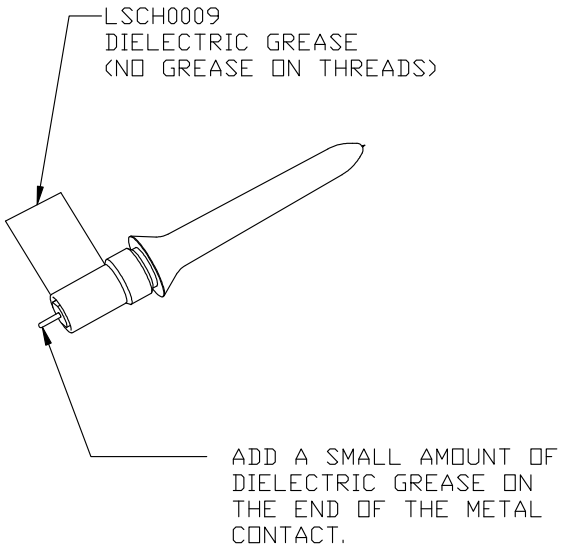
If readings fall out of this range, disassemble electrode assembly and check reading of resistor only. If reading is in the acceptable range, discard the electrode body (A11342-00) and replace with a new one. Rebuild electrode assembly as follows: apply a small amount of dielectric grease to each end of the resistor, slide resistor into the electrode body (A11342-00). Install the contact assembly after the resistor. Finally, apply a small amount of dielectric grease to contact area of plunger contact assembly. Thread plunger contact assembly into electrode body by hand until it stops. Hand-tight is good enough. Over-tightening will damage the electrode body (see "Disassembly/Assembly Electrode Assembly" figure).




**Disassembly/Assembly Electrode Assembly**

**Before Installing A New or Used Electrode Into the High Voltage Ring**

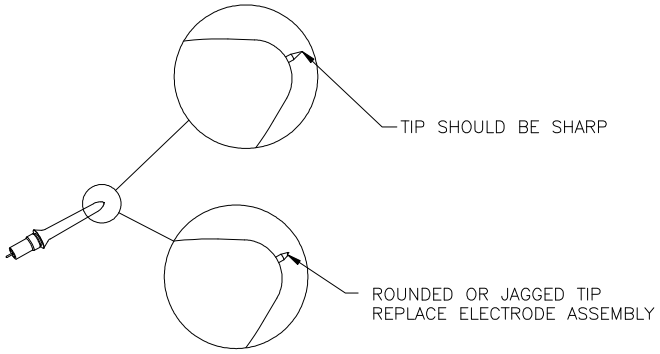
Replace the dielectric grease in the area as shown in “Replacing Dielectric Grease” figure. A thin film is all that is required.




**Replacing Dielectric Grease**

**Electrode Tip Inspection**

Inspect the electrode tips weekly or sooner. If a collision has occurred, immediate inspection is required. The tip of the electrode should be sharp and pointed. After time, the tip will wear. If the tip is rounded or worn jagged, it must be replaced. Depending on use, electrode tips will last 3-6 months. The electrostatic field generated by these electrodes are very important to maintain paint transfer efficiency, pattern uniformity, and atomizer cleanliness.

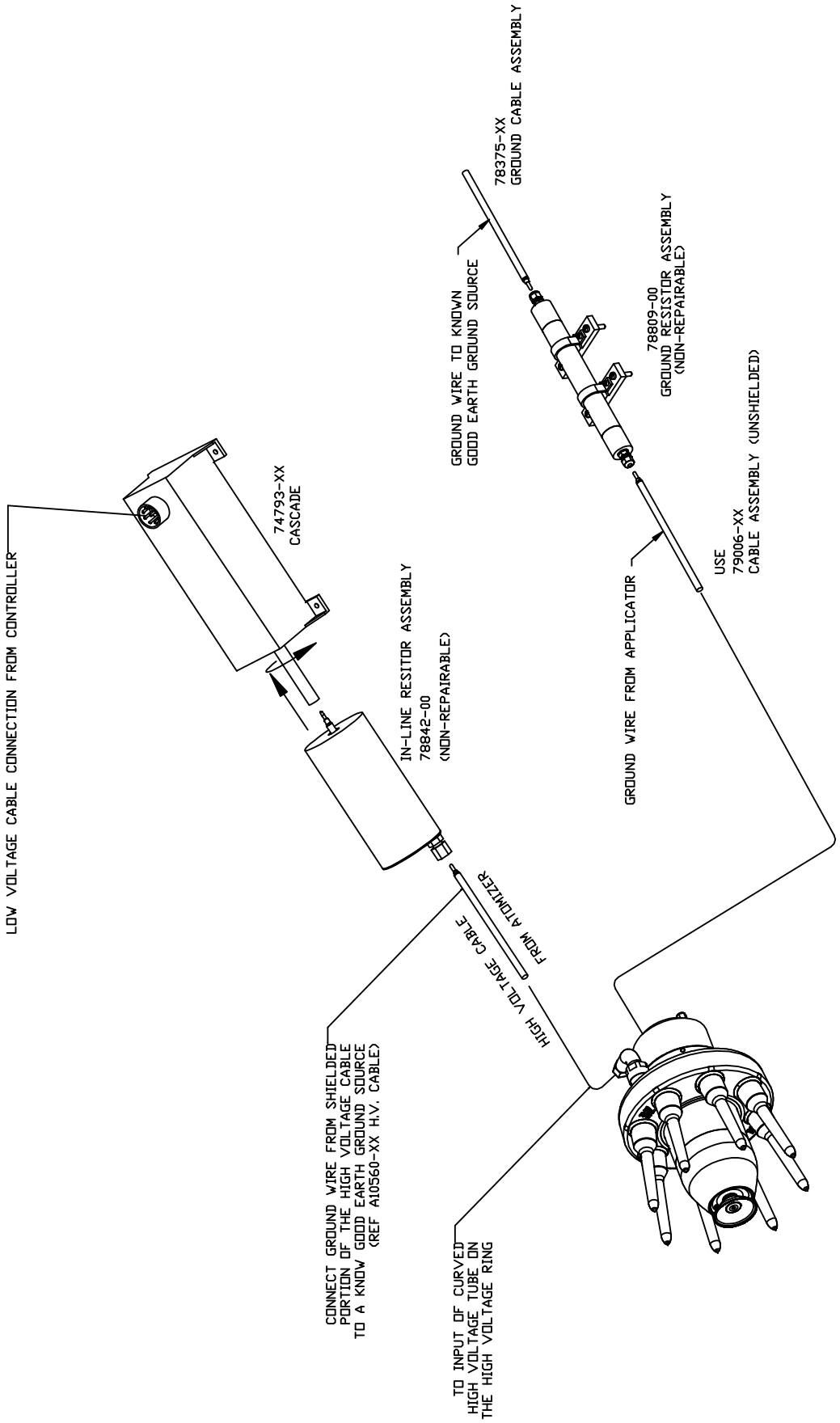



**N O T E**

**Applications above 5,000-feet Sea Level:** When using the MMA-303 atomizer with indirect charge above 5,000-feet sea level, it must be used in conjunction with a 78842-00 in-line resistor assembly and a 78809-00 ground resistor assembly (see “Indirect Charge Schematic for Use Above 5,000-Ft. Sea Level” figure).

| GROUND CONNECTION CABLE (Indirect Charge Only) | |
|---|---|
| **Part #** | **Description** |
| 78375-10 | Cable, High Voltage Ground, 10-ft. |
| 78375-25 | Cable, High Voltage Ground, 25-ft. |
| 78375-50 | Cable, High Voltage Ground, 50-ft. |
| 78375-75 | Cable, High Voltage Ground, 75-ft. |
| 78375-100 | Cable, High Voltage Ground, 100-ft. |

| HIGH VOLTAGE CABLE ASSEMBLY (Direct or Indirect Charge) | |
|---|---|
| **Part #** | **Description** |
| 79006-15 | High Voltage Cable Assembly, Unshielded Sleeve, 15-ft. |
| 79006-20 | High Voltage Cable Assembly, Unshielded Sleeve, 20-ft. |
| 79006-50 | High Voltage Cable Assembly, Unshielded Sleeve, 50-ft. |
| 79006-75 | High Voltage Cable Assembly, Unshielded Sleeve, 75- ft. |
| 79006-100 | High Voltage Cable Assembly, Unshielded Sleeve, 100-ft. |
| A10560-15 | High Voltage Cable Assembly, Shielded, Non-Metallic Cen. Cond., 15-ft. |
| A10560-20 | High Voltage Cable Assembly, Shielded, Non-Metallic Cen. Cond., 20-ft. |
| A10560-25 | High Voltage Cable Assembly, Shielded, Non-Metallic Cen. Cond., 25-ft. |
| A10560-50 | High Voltage Cable Assembly, Shielded, Non-Metallic Cen. Cond., 50-ft. |
| A10560-75 | High Voltage Cable Assembly, Shielded, Non-Metallic Cen. Cond., 75-ft. |
| A10560-100 | High Voltage Cable Assembly, Shielded, Non-Metallic Cen. Cond., 100-ft. |




**Indirect Charge Schematic for Use Above 5,000-Ft. Sea Level**

# *OPERATOR / MAINTENANCE*

## ****WARNINGS****

**Do not** attempt to hold a rag or a gloved hand against the bell edge to stop or slow down a rotating bell.

**Do not** attempt to clean the bell edge while the bell is rotating.

**Do not** attempt to use sharp or abrasive materials to clean the bell, which will scratch or damage the bell.

**Do not** attempt to place a high voltage probe on the bell edge unless rotation is full stopped.

**Do not** reuse an atomizer bell that shows signs of damage such as nicks, heavy scratches, dents, or excessive wear (defined under "Bell Cup Cleaning" in the "Maintenance" section).

# TROUBLESHOOTING GUIDE—INDIRECT CHARGE

| General Problem | Possible Causes | Corrective Action |
|---|---|---|
| **Bad Spray Pattern** | 1. Bell cup damaged | 1. Replace bell cup. |
| | 2. Low voltage | 2. See "Low or No High Voltage" below. |
| | 3. Paint lodged in shaping air ring | 3. Disassemble and clean (see "Maintenance" section). |
| **Low or No High Voltage** | 1. High current draw | 1. Check resistance of electrodes. |
| | 2. MicroPak controller cascade | 2. Inspect low voltage at the MicroPak and the cascade.<br>a. Faulty low voltage cable. |
| | 3. Improperly mounted air turbine | 3. Verify ground connection of air turbine to earth ground at less than 1 megohm. |
| | 4. Faulty low voltage connections (usually indicated by MicroPak feedback fault light) | 4. a. Make sure quick disconnection electrical connection is aligned and clean.<br>b. Check low voltage connection at cascade. |
| | 5. Faulty high voltage connection | 5. Verify that high voltage cable is fully seated in the cascade and the high voltage ring. |
| | 6. MicroPak or cascade failure | 6. Refer to current MicroPak manual for detailed Troubleshooting Guide. |
| | 7. MicroPak settings not correct | 7. Refer to current "MicroPak" manual for detailed "Troubleshooting Guide." |
| | 8. Damaged high voltage cable | 8. Remove and inspect/measure resistance. |
| | 9. Dielectric breakdown of high voltage parts | 9. Check cascade, high voltage ring, and high voltage cable. Replace defective parts. |
| | 10. Improper color change (i.e., paint or solvent in dump line) | 10. Optimize color change. |
| **Low Transfer Efficiency (or light coverage)** | 1. Low or no high voltage | 1. Verify high voltage at electrodes. Normally, a high voltage setting of 30-70 kV is appropriate for most applications. |
| | 2. Poor grounding of parts being coated | 2. Verify that parts being coated are properly grounded (the electrical resistance between the part and ground must not exceed 1 megohm). |

**Troubleshooting Guide — Indirect Charge (Cont.)**

| General Problem | Possible Causes | Corrective Action |
|---|---|---|
| **Low Transfer Efficiency (or light coverage) (Cont.)** | 3. Excessive turbine speed | 3. For optimum transfer efficiency and spray pattern control, the bell rotational speed should be set at the minimum required to achieve proper atomization of the coating material. |
| | 4. Excessive robot speed | 4. For optimum transfer efficiency, spray pattern control, bell speed, and robot speed should be set at the minimum to achieve desired results of part to be coated. |
| | 5. Excessive inner/outer shaping air | 5. Shaping air should be set at the minimum volume required to gently direct the spray pattern toward the part being coated. Excessive shaping air will cause some atomized particles to "blow-by" the part or bounce back onto the atomizer. |
| | 6. Excessive target distance | 6. The recommended target distance is between 6 and 12-inches (152.4-304.8mm) (see "Target Distance" in the "Operation" section of this manual). |
| **No Turbine Air** | 1. Turbine drive air not present | 1. Verify supply air pressure. |
| | 2. Bearing air return signal not present | 2. a. Verify bearing air return signal.<br>b. Increase bearing air supply pressure to 90 psig (±10 psig) (620.5 +/- 69 kPa). |
| | 3. Brake air is activated | 3. Remove brake air signal (turbine air and brake air must be interlocked to prevent both from being used simultaneously). |

**Troubleshooting Guide — Indirect Charge (Cont.)**

| General Problem | Possible Causes | Corrective Action |
|---|---|---|
| **Speed Feedback Fault** | 1. Damaged fiber optic cable between robot plate and control panel | 1. a. Repair or replace fiber optic cable.<br>b. Bad splice connection or too many splices. Maximum three (3) splices permitted. |
| | 2. Connection at robot or bell plate is loose | 2. Re-install cable and tighten locking set screw. |
| | 3. Fiber optic transmitter failure | 3. Replace fiber optic transmitter. |
| | 4. Bad transceiver module | 4. Replace transceiver module. |
| | 5. Excessive vibration | 5. a. Check bell cup for damage<br>b. Check bell cup for excessive paint buildup<br>c. Insure bell cup is tightened properly<br>d. Check cup and shaft tapers for cleanliness |
| **No Fluid Flow** | 1. Turbine is not rotating | 1. Verify rotation of turbine (the paint valve air pilot must be interlocked with the turbine speed feed back signal to ensure that paint does not flow into the air bearing). |
| | 2. Fluid valve does not actuate | 2. a. Verify that air pilot signal is present.<br>b. Fluid valve air pilot pressure is too low. Increase air pressure to 70 psig minimum.<br>c. Replace fluid valve. |
| | 3. Clogged fluid tube/fluid tip | 3. Remove and inspect fluid tube or fluid tip. |
| | 4. Bad transceiver module | 4. Replace transceiver module. |
| **Continuous Fluid Flow** | 1. Fluid valve open | 1. a. Remove air pilot signal.<br>b. If still open, replace fluid valve. |
| | 2. Fluid valve seat damaged or worn | 2. Replace fluid valve seat. |
| **Uncontrollable Fluid Flow** | 1. Insufficient back pressure to fluid regulator | 1. Replace fluid tip with the next smaller inner diameter size. |
| | 2. Fluid regulator does not control flow (system) | 2. Disassemble fluid regulator and inspect for failed components (system). |

# TROUBLESHOOTING GUIDE—DIRECT CHARGE

| General Problem | Possible Causes | Corrective Action |
|---|---|---|
| **Bad Spray Pattern** | 1. Bell cup damaged<br>2. Low voltage<br>3. Paint lodged in shaping air ring | 1. Replace bell cup.<br>2. See "Low or No High Voltage" below.<br>3. Disassemble and clean (see "Maintenance" section). |
| **Low or No High Voltage** | 1. High current draw<br><br>2. Solvent valve is actuated<br><br><br><br>3. Loss of low voltage cable connection between robot and bell plates<br><br><br><br><br><br><br><br>4. Improperly mounted air turbine<br><br>5. Improper limiting current and voltage settings high voltage parts<br>6. Atomizer grounding out (usually indicated by high current draw or by MicroPak over-current fault light) | 1. a. Paint resistivity to be .1 MW to h.<br>b. Replace coiled fluid line.<br>2. Remove solvent valve air pilot signal (high voltage must be interlocked with the solvent valve air pilot signal to prevent solvent flow while high voltage is energized).<br>3. a. Remove atomizer 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 secure, but not too tight, as this will prevent the spring-loaded pins on the robot plate from extending and making contact.<br>b. Faulty low voltage cable.<br>4. Verify correct orientation of air turbine so that high voltage spring makes contact with metal pad on turbine assembly.<br>5. To readjust settings, refer to "MicroPak" operating manual.<br>6. a. Clean atomizer externally with non-polar solvent.<br>b. Check the atomizer externally with non-polar solvent.<br>c. Check for fluid leaks at quick disconnect mounting (between bell plate and robot plate).<br>d. Check for internal arcing (usually indicated by internal sparking sounds).<br>e. Make sure cascade low voltage connection is properly shielded. |

**Troubleshooting Guide — Direct Charge (Cont.)**

| General Problem | Possible Causes | Corrective Action |
|---|---|---|
| **Low or No High Voltage (Cont.)** | 7. Faulty low voltage connections (Usually indicated by MicroPak feedback fault light) | 7. Make sure quick disconnect electrical connection is aligned and clean.<br>a. Check low voltage connection at cascade. |
| | 8. Faulty high voltage connection | 8. a. Remove cascade and check continuity between cascade connection and turbine shaft. |
| | 9. MicroPak or cascade failure | 9. Refer to "MicroPak" service manual for detailed "Troubleshooting Guide". |
| | 10. Improper color change (i.e., paint or solvent in dump line) | 10. Optimize color change. |
| **Low Transfer Efficiency (or light coverage)** | 1. Low or no high voltage | 1. Verify high voltage at bell cup edge. Normally a high voltage setting of 70-100 kV is appropriate for most applications. |
| | 2. Poor grounding of parts being coated | 2. Verify that parts being coated are properly grounded (the electrical resistance between the part and ground must not exceed 1 megohm). |
| | 3. Excessive turbine speed | 3. For optimum transfer efficiency and spray pattern control, the bell rotational speed should be set at the minimum required to achieve proper atomization of the coating material. |
| | 4. Excessive inner/outer shaping air | 4. Shaping air should be set at the minimum volume required to gently direct the spray pattern toward the part being coated. Excessive shaping air will cause some atomized particles to "blow-by" the part or bounce back onto the atomizer. |
| | 5. Excessive target distance | 5. The recommended target distance is between 6-12 inches (152.4-304.8 Nm) (see "Target Distance" in the "Operation" section of this manual). |
| **No Turbine Air** | 1. Turbine drive air not present | 1. Verify supply air pressure. |
| | 2. Bearing air return signal not present | 2. a. Verify bearing air return signal.<br>b. Increase bearing air supply pressure to 90 psig (± 10 psig) (620.5 ± 68.9 kPa). |
| | 3. Brake air is activated | 3. Remove brake air signal (turbine air and brake air must be interlocked to prevent both from being used simultaneously). |

| Troubleshooting Guide — Direct Charge (Cont.) | | |
|---|---|---|
| **General Problem** | **Possible Causes** | **Corrective Action** |
| **Speed Feedback Fault** | 1. Damaged fiber optic cable between robot plate and control panel | 1. Repair or replace the fiber optic cable. |
| | 2. Connection at robot or bell plate is loose | 2. Reinstall cable and tighten locking set screw. |
| | 3. Fiber optic transmitter failure | 3. Replace fiber optic transmitter. |
| | 4. Bad transceiver module | 4. Replace transceiver module. |
| | 5. Excessive vibration | 5. a. Check bell cup for damage.<br>b. Check bell cup for excessive paint buildup.<br>c. Ensure bell cup is tightened properly.<br>d. Check cup and shaft tapers for cleanliness. |
| **No Fluid Flow** | 1. Turbine is not rotating | 1. Verify rotation of turbine (the paint valve air pilot must be interlocked with the turbine speed feed back signal to ensure that paint does not flow into the air bearing). |
| | 2. Fluid valve does not actuate | 2. a. Verify that air pilot signal is present.<br>b. Fluid valve air pilot signal is too low. Increase air pressure to 70 psig (482.6 kPa) minimum.<br>c. Replace fluid valve. |
| | 3. Clogged fluid tube | 3. Remove and inspect fluid tube. |
| | 4. Bad transceiver module | 4. Replace transceiver module. |
| **Continuous Fluid Flow** | 1. Fluid valve open | 1. a. Remove air pilot signal.<br>b. If still open, replace fluid valve. |
| | 2. Fluid valve seat damaged or worn | 2. Inspect and retighten. |
| **Uncontrollable Fluid Flow** | 1. Insufficient back pressure to fluid regulator | 1. Replace fluid tube with the next smaller inner diameter size. |
| | 2. Fluid regulator does not control flow (system) | 2. Disassemble fluid regulator and inspect for paint and solvent. |

**Troubleshooting Guide — Direct Charge (Cont.)**

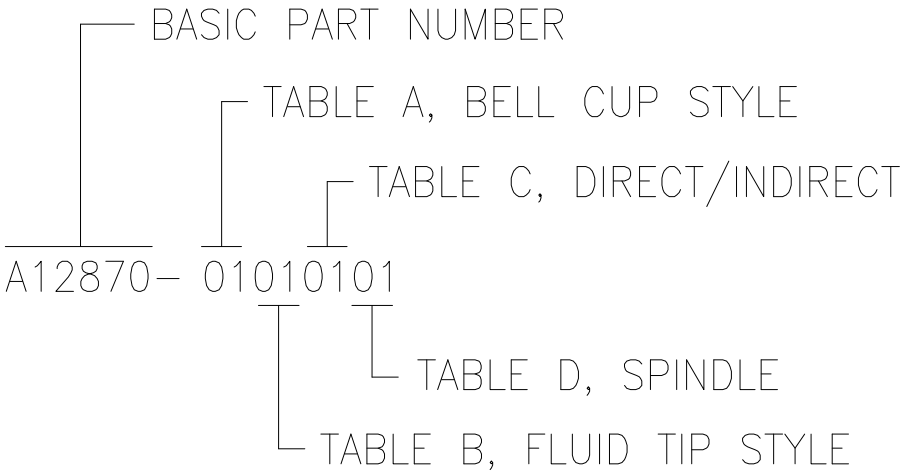
| General Problem | Possible Causes | Corrective Action |
|---|---|---|
| **Fluid and/or Air Leakage Between the Robot and Bell Manifold Plates** | 1. Atomizer mounting ring is loose | 1. Tighten mounting ring. |
| | 2. O-ring is missing | 2. Install O-ring. |
| | 3. O-ring is damaged | 3. Visually inspect for damage and replace. |
| **Fluid Leakage In Fluid Manifold or Bell Plate** | 1. O-ring is damaged | 1. Replace O-ring. |
| | 2. Fluid tubing not properly installed or tightened. | 2. Inspect and retighten. |
| ***Fluid Leakage Around Fluid Valve*** | 1. Damaged o-ring(s) on outer diameter of valve body | 1. Replace o-ring(s). |
| | 2. Damaged or worn needle seals inside valve assembly | 2. Replace valve assembly. |
| **Turbine Cannot Attain Desired Speed** | 1. Excessive vibration | 1. a. Check bell cup for damage<br>b. Check bell cup for excessive paint buildup<br>c. Bell cup loose - tighten to proper torque<br>d. Check cup and shaft tapers for cleanliness<br>e. Have manufacturing check bell cup balance |
| | 2. Low or no bearing air | 2. a. Check bearing air pressure (minimum 80 psi) (352 kPa)<br>b. Check filters for contamination<br>c. Check for bent or damaged bearing air line<br>d. Poor turbine air pressure - plant air<br>e. Damaged speed control cards |
| | 3. Loss of fiber optic/no feed back | 3. Damaged fiber optic sensor, bad cable, too many splices. Maximum three (3) slices per-mitted. |
| **Loss of Exterior/ Interior Cup Wash or Lack of Flow** | 1. Bent of kinked supply tube | 1. Replace. |
| | 2. No fluid flow | 2. Check microvalve, check fluid supply source. |
| | 3. Blocked fluid tip or external nozzle. | 3. Clean parts, remove obstruction. |
| | 4. Ferrules holding tubing over -tightened. | 4. Replace tubing and ferrule assembly. |

# PARTS IDENTIFICATION

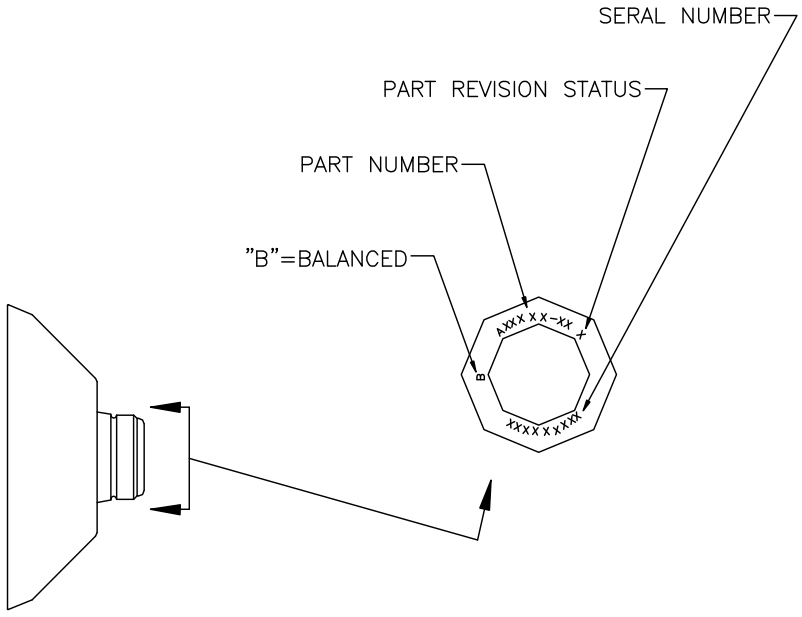
**MMA-303 DIRECT/INDIRECT CHARGE ROTARY ATOMIZER MODEL IDENTIFICATION**

When ordering, use A12870-ABCD as indicated by Tables A, B, C, and D. Four (4) digits must follow the basic part number.

For Example:




*** Model number and serial number of the atomizer is located on the face of the rear plate assembly. (See "Important Numbers" in the "Introduction" section.)**

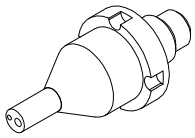


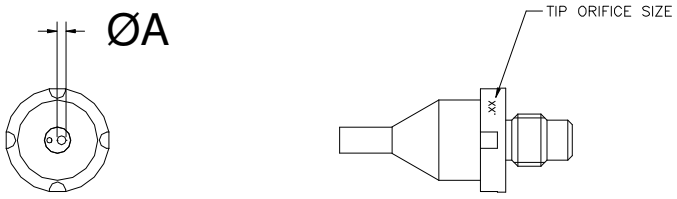

**Bell Cup Part Number / Serial Number**

**TABLE A - Bell Cup Style**

| DASH NO. | A | DESCRIPTION |
|---|---|---|
| 03 | A11730−00 | 55MM STANDARD SERRATED TITANIUM (TISF) |
| 04 | A11783−01 | 55MM STANDARD NON−SERRATED TITANIUM (TIF) |
| 05 | A11783−00 | 55MM STANDARD SERRATED ALUMINUM (ALSF) |
| 06 | A11968−00 | 30MM SERRATED TITANIUM |
| 07 | A11968−01 | 30MM SERRATED ALUMINUM |
| 08 | A12900−00 | 65MM SERRATED TITANIUM (TISF) |
| 09 | A12900−01 | 65MM NON−SERRATED TITANIUM (TIF) |
| 10 | A13114−00 | 55MM SERRATED TITANIUM (TISF) FOR DUAL FLEX |
| 11 | A13114−01 | 55MM NON−SERRATED TITANIUM (TIF) FOR DUAL FLEX |
| 12 | A12900−02 | 65MM SER. TITANIUM /LONG LIFE SPLASH PLATE (TISF) |
| 13 | A12900−03 | 65MM NON. SER. TITANIUM /LONG LIFE SPLASH PLATE (TIF) |
| 14 | A12900−04 | 65MM SER. ALUMINUM /PLASTIC SPLASH PLATE |
| 15 | A12900−05 | 65MM NON. SER. ALUMINUM /PLASTIC SPLASH PLATE |

**NOTE** - Tighten bell cup to 50-70 lbs•in (5.65-7.9 Nm) torque.






**Fluid Tip Selection**

| TABLE B - Fluid Tip Selection | | |
|---|---|---|
| **Dash No.** | **Description - Ø "A"** | **"B"** |
| 01 | .028/.7mm Opening | A11240--01 |
| 02 | .035/.9mm Opening | A11240-02 |
| 03 | .043/1.1mm Opening | A11240-03 |
| 04 | .047/1.2mm Opening | A11240-04 |
| 05 | .062/1.57mm Opening | A11240-05 |
| 06 | .039/1.0mm Opening | A11240-06 |

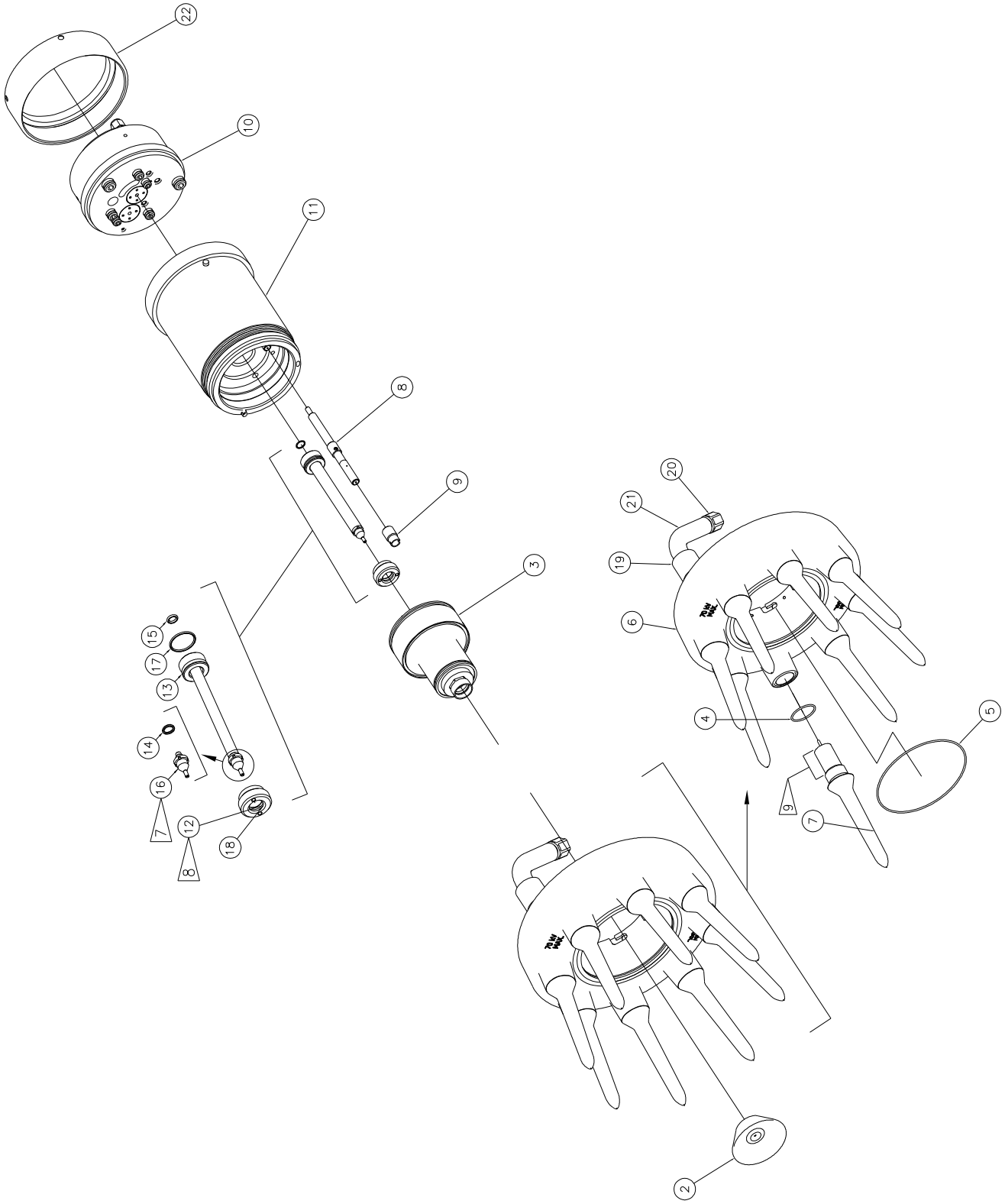
## TABLE C - Shaping Air / Repulsion Ring / Charge Application

| DASH NO. | DESCRIPTION | C | D | E | F | H |
|---|---|---|---|---|---|---|
| 01 | 55MM STANDARD DIRECT CHARGE | A12874-01 | – | – | – | A12090-01 |
| 02 | 55MM STANDARD DIRECT CHARGE WITH REPULSION RING | A12874-02 | – | – | – | A12090-01 |
| 03 | 30MM DIRECT CHARGE | A12874-03 | – | – | – | A12090-01 |
| 04 | 30MM DIRECT CHARGE WITH REPULSION RING | A12874-04 | – | – | – | A12090-01 |
| 05 | 65 MM MONO FLEX DIRECT CHARGE | A12874-05 | – | – | – | A12090-02 |
| 06 | 65 MM MONO FLEX DIRECT CHARGE WITH REPULSION RING | A12874-06 | – | – | – | A12090-02 |
| 07 | 65 MM MONO FLEX INDIRECT CHARGE (220 MEGOHMS) | A12874-07 | 8 | A11343-02 | 1 | A12090-02 |
| 08 | 65 MM MONO FLEX INDIRECT CHARGE (140 MEGOHMS) | A12874-07 | 8 | A11343-03 | 1 | A12090-02 |
| 09 | 65 MM DUAL FLEX DIRECT CHARGE | A12874-08 | – | – | – | A12090-02 |
| 10 | 65 MM DUAL FLEX DIRECT CHARGE WITH REPULSION RING | A12874-09 | – | – | – | A12090-02 |
| 11 | 65 MM DUAL FLEX INDIRECT CHARGE (220 MEGOHMS) | A12874-10 | 8 | A11343-02 | 1 | A12090-02 |
| 12 | 65 MM DUAL FLEX INDIRECT CHARGE (140 MEGOHMS) | A12874-10 | 8 | A11343-03 | 1 | A12090-02 |
| 13 | 55MM STANDARD DIRECT CHARGE | A12874-01 | – | – | – | – |
| 14 | 55MM STANDARD DIRECT CHARGE WITH REPULSION RING | A12874-02 | – | – | – | – |
| 15 | 30MM DIRECT CHARGE | A12874-03 | – | – | – | – |
| 16 | 30MM DIRECT CHARGE WITH REPULSION RING | A12874-04 | – | – | – | – |
| 17 | 65 MM MONO FLEX DIRECT CHARGE | A12874-05 | – | – | – | – |
| 18 | 65 MM MONO FLEX DIRECT CHARGE WITH REPULSION RING | A12874-06 | – | – | – | – |
| 19 | 65 MM MONO FLEX INDIRECT CHARGE (220 MEGOHMS) | A12874-07 | 8 | A11343-02 | 1 | – |
| 20 | 65 MM MONO FLEX INDIRECT CHARGE (140 MEGOHMS) | A12874-07 | 8 | A11343-03 | 1 | – |
| 21 | 65 MM DUAL FLEX DIRECT CHARGE | A12874-08 | – | – | – | – |
| 22 | 65 MM DUAL FLEX DIRECT CHARGE WITH REPULSION RING | A12874-09 | – | – | – | – |
| 23 | 65 MM DUAL FLEX INDIRECT CHARGE (220 MEGOHMS) | A12874-10 | 8 | A11343-02 | 1 | – |
| 24 | 65 MM DUAL FLEX INDIRECT CHARGE (140 MEGOHMS) | A12874-10 | 8 | A11343-03 | 1 | – |
| 25 | 55 MM DUAL FLEX DIRECT CHARGE | A12874-12 | – | – | – | – |
| 26 | 55 MM DUAL FLEX INDIRECT CHARGE (220 MEGOHMS) | A12874-13 | 8 | A11343-02 | 1 | – |
| 27 | 55 MM DUAL FLEX INDIRECT CHARGE (140 MEGOHMS) | A12874-13 | 8 | A11343-03 | 1 | – |
| 28 | 55 MM DUAL FLEX DIRECT CHARGE | A12874-12 | – | – | – | A12090-02 |
| 29 | 55 MM DUAL FLEX INDIRECT CHARGE (220 MEGOHMS) | A12874-13 | 8 | A11343-02 | 1 | A12090-02 |
| 30 | 55 MM DUAL FLEX INDIRECT CHARGE (140 MEGOHMS) | A12874-13 | 8 | A11343-03 | 1 | A12090-02 |
| 31 | 65 MM DUAL FLEX INDIRECT CHARGE (TFE SHROUD) 220 MEGOHMS | A12874-11 | 8 | A11343-02 | 1 | – |
| 32 | 65 MM DUAL FLEX INDIRECT CHARGE (TFE SHROUD) 140 MEGOHMS | A12874-11 | 8 | A11343-03 | 1 | – |
| 33 | 65 MM DUAL FLEX INDIRECT CHARGE (TFE SHROUD) 220 MEGOHMS | A12874-11 | 8 | A11343-02 | 1 | A12090-02 |
| 34 | 65 MM DUAL FLEX INDIRECT CHARGE (TFE SHROUD) 140 MEGOHMS | A12874-11 | 8 | A11343-03 | 1 | A12090-02 |

## TABLE D - Spindle

| DASH NO. | I | DESCRIPTION * |
|---|---|---|
| 00 | NONE | NONE |
| 01 | A12895-00 | SPINDLE, W/SHAPE AIR HOLES |
| 02 | A12895-01 | SPINDLE, W/NO SHAPE AIR HOLES |
| 03 | A12895-03 | SPINDLE, W/SHAPE AIR HOLES |
| 04 | A12895-04 | SPINDLE, W/NO SHAPE AIR HOLES |

*** Customer must verify spindle part number located on outer housing, see page 12**




**MMA-303 ASSEMBLY**

## PARTS IDENTIFICATION (Cont.)

### RMA-303 PARTS LIST

| | ITEM NO. | QTY | PART NUMBER | DESCRIPTION |
|---|---|---|---|---|
| | 1 | 1 | C | KIT, SHAPING AIR |
| 3 | 2 | 1 | A | ASSEMBLY, BELL CUP |
| | 3 | 1 | I * | SPINDLE ASS'Y |
| | 4 | D | 79001-45 | O-RING SOLVENT PROOF |
| | 5 | F | LSOR0005-14 | O-RING, FEP ENCAPSULATED |
| | 6 | F | A12079-00 | HV RING |
| | 7 | D | E | ELECTRODE ASSEMBLY |
| | 8 | 1 | A11531-00 | ASS'Y, FIBER OPTIC TRANSMITTER |
| | 9 | 1 | 78278-00 | NUT, FIBER OPTIC TENSIONING |
| | 10 | 1 | A12711-00 | MOUNTING MANIFOLD ASSEMBLY |
| | 11 | 1 | A11558-00 | ATOMIZER BODY ASSEMBLY |
| 2 | 12 | 1 | A11226-00 | RETAINER, FLUID TUBE |
| | 13 | 1 | A11245-00 | FEED TUBE |
| | 14 | 1 | 79001-44 | O-RING, SOLVENT PROOF |
| | 15 | 1 | 79001-40 | O-RING, SOLVENT PROOF |
| 1 | 16 | 1 | B | FLUID TIP |
| | 17 | 1 | 79001-41 | O-RING, SOLVENT PROOF |
| | 18 | 1 | 79001-42 | O-RING, SOLVENT PROOF |
| | 19 | F | A11318-00 | LOCKNUT, HV TUBE |
| | 20 | F | 78441-00 | FERRULE NUT, 3/8 OD |
| | 21 | F | A11317-00 | BENT TUBE |
| | 22 | 1 | A11559-00 | RING, QUICK DISCONNECT |
| | TOOLS & LITERATURE TO BE SHIPPED WITH EACH APPLICATOR | | | |
| | 29 | 1 | H | TOOL KIT, RMA-303 |
| | 30 | 1 | 77141-21 | LITERATURE KIT (NOT SHOWN) |
| | 31 | 4 | 78268-00 | SCREW, SOCKET HD CAP (NOT SHOWN) |

*** Customer must verify spindle part number located on outer housing, see page 12.**

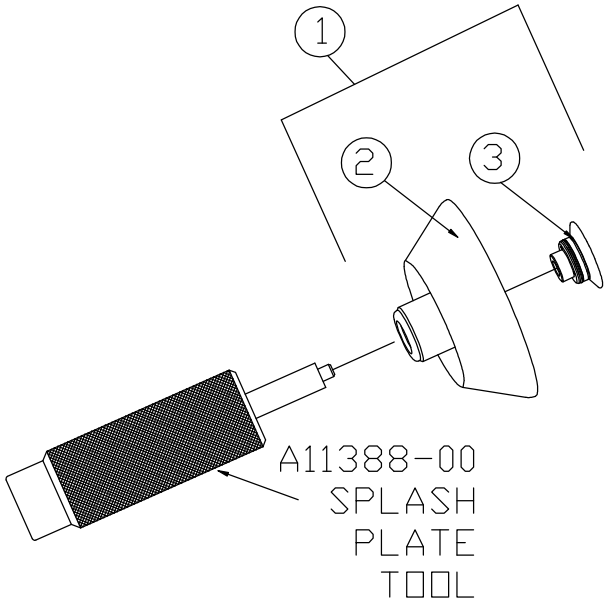
**NOTES:**

3 Lightly coat this area with LSCH0009 Dielectric Grease. No grease on threads.

2 Torque fluid tube into atomizer body using Tool A11229-00 to 65-75 lbs•in (7.34-8.47 Nm).

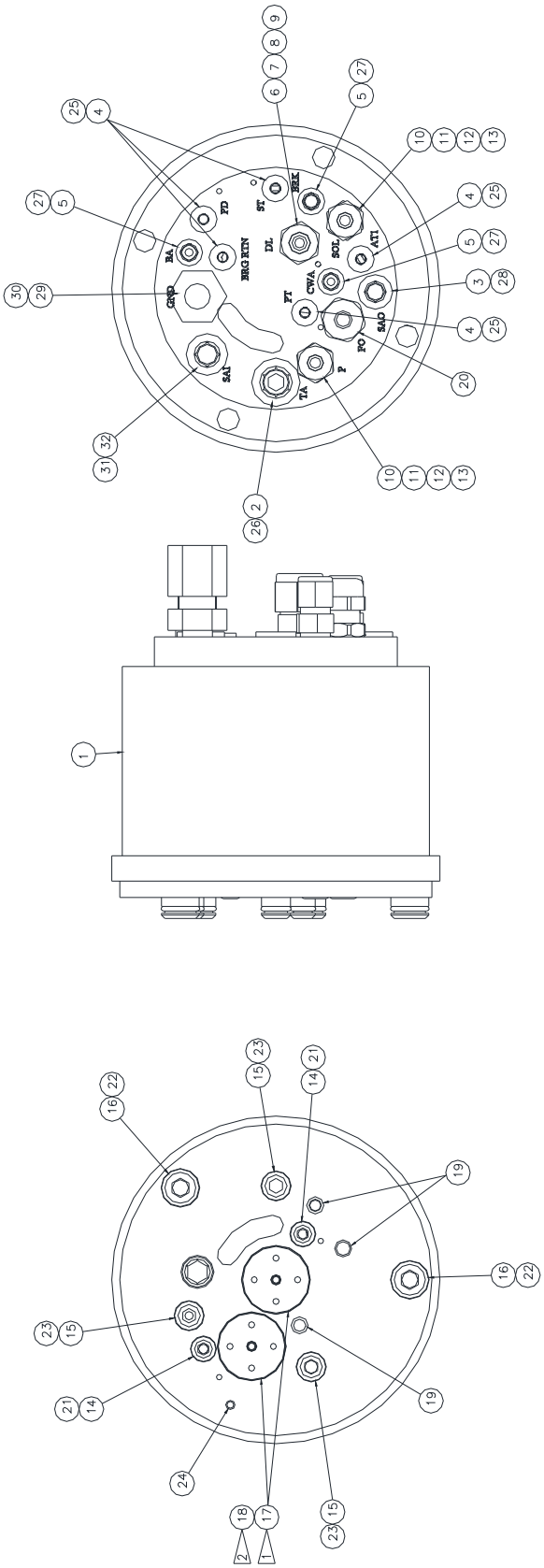
1 Torque fluid tip using Tool A11229-00 to 25-30 lbs•in (2.83-3.39 Nm).

## PARTS IDENTIFICATION (Cont.)




| TYPICAL BELL CUP PARTS BREAKDOWN | | | |
|---|---|---|---|
| **Complete Assembly 1** | **Description** | **Cup Only 2** | **Splash Plate Assembly 3** |
| A11730-00 | 55mm Titanium Serrated (TISF) | A11732-00 | A11269-00 (White Color) |
| A11730-01 | 55mm Titanium Non-Serrated (TIF) | A12522-00 | A11269-00 (White Color) |
| A11783-00 | 55mm Aluminum Serrated (ALSF) | A11782-00 | A11269-00 (White Color) |
| A11968-00 | 30mm Titanium Serrated (TIS) | A11964-00 | A11954-00 (White Color) |
| A11968-01 | 30mm Aluminum Serrated (ALS) | A11964-01 | A11954-00 (White Color) |
| A13114-00 | 55mm Titanium Serrated Flip Edge (TISF) | A13113-00 | A11269-00 (White Color) |
| A13114-01 | 55mm Titanium Non-Serrated (TIF) | A13113-01 | A11269-00 (White Color) |
| A12900-00 | 65mm Titanium Serrated (TISF) | A12886-00 | A12071-00 (Black Color) |
| A12900-01 | 65mm Titanium Non-Serrated (TIF) | A12886-01 | A12071-00 (Black Color) |
| A12900-02 | 65mm Titanium Serrated W/Long Life Splash Plate (TIF) | A12886-00 | A13004-00 (Black Color) |
| A12900-03 | 65mm Titanium Non-Serrated W/Long Life Splash Plate (TIF) | A12886-01 | A13004-00 (Black Color) |
| A12900-04 | 65mm Aluminum Serrated W/Plastic Splash Plate | A12886-02 | A12071-00 (Black Color) |
| A12900-05 | 65mm Aluminum Non-Serrated W/Plastic Splash Plate | A12886-03 | A12071-00 (Black Color) |

## PARTS IDENTIFICATION (Cont.)



## PARTS IDENTIFICATION (Cont.)

**A12711-00 MOUNTING MANIFOLD - PARTS LIST**

| ITEM | QTY | PART NUMBER | DESCRIPTION | |
|---|---|---|---|---|
| 1 | 1 | A12710-00 | MOUNTING MANIFOLD | |
| 2 | 1 | 77762-03 | COLLET, 12 MM | |
| 3 | 1 | 77762-04 | COLLET, 8 MM | |
| 4 | 5 | 77516-04 | COLLET, 4MM | |
| 5 | 3 | 77762-01 | COLLET, 6MM | |
| 6 | 1 | A12138-01 | NUT, 8MM | |
| 7 | 1 | A13294 | FITTING, 8 MM ODTX AN | 3 |
| 8 | 1 | A12138-03 | FERRULE, REAR 8 MM | |
| 9 | 1 | A12138-02 | FERRULE, FRONT 8 MM | |
| 10 | 2 | 78273-00 | NUT, MODIFIED 6MM | |
| 11 | 2 | 78265-00 | FITTING, 6MM AN | 3 |
| 12 | 2 | 78270-00 | FERRULE, REAR 6 MM | |
| 13 | 2 | 78269-00 | FERRULE, FRONT 6 MM | |
| 14 | 2 | A11555-00 | AIR STUD, SMALL | |
| 15 | 3 | A11556-00 | AIR STUD, MEDIUM | |
| 16 | 2 | A11557-00 | AIR STUD, LARGE | |
| 17 | 2 | 78949-00 | VALVE ASSEMBLY | 1 |
| 18 | 2 | 77367-00 | VALVE SEAT ASSEMBLY | 2 |
| 19 | 3 | 79001-40 | O-RING, SOLVENT PROOF | |
| 20 | 1 | 20869-14 | FIBER OPTIC TENSIONING | |
| 21 | 2 | 79001-05 | O-RING, SOLVENT PROOF | |
| 22 | 2 | 79001-07 | O-RING, SOLVENT PROOF | |
| 23 | 3 | 79001-06 | O-RING, SOLVENT PROOF | |
| 24 | 1 | 79001-39 | O-RING, SOLVENT PROOF | |
| 25 | 5 | 79001-30 | O-RING, SOLVENT PROOF | |
| 26 | 1 | 79001-33 | O-RING, SOLVENT PROOF | |
| 27 | 3 | 79001-32 | O-RING, SOLVENT PROOF | |
| 28 | 1 | 79001-34 | O-RING, SOLVENT PROOF | |
| 29 | 1 | 13521-03 | FERRULE NUT | |
| 30 | 1 | 18687-00 | CONNECTOR BODY | |
| 31 | 1 | 77762-02 | COLLET, 10MM | |
| 32 | 1 | 79001-31 | O-RING, SOLVENT PROOF | |

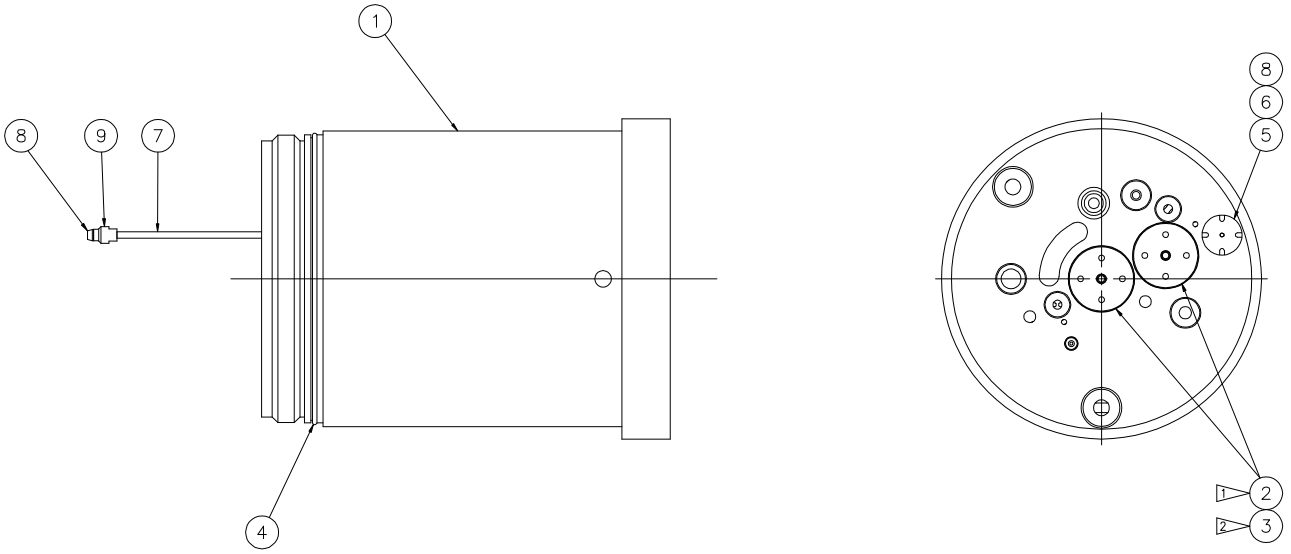
**NOTES:**

3 Torque to 15 lbs•in (1.69 Nm) after fitting is seated.

2 Torque to 15-20 lbs•in (2.82-3.95 Nm).

1 Torque to 15-20 lbs•in (2.82-3.95 Nm) after valve is down.

## PARTS IDENTIFICATION (Cont.)




| A11558-00 ATOMIZER BODY ASSEMBLY - PARTS LIST | | | |
|---|---|---|---|
| **Item #** | **Part #** | **Description** | **Qty** |
| 1 | A11560-00 | Atomizer Body Sub-Assembly | 1 |
| 2 | 78949-00 | Valve Assembly *See Note 1 | 2 |
| 3 | 77367-00 | Valve Seat Assembly *See Note 2 | 2 |
| 4 | 79001-22 | O-Ring, Solvent Proof *See Note 3 | 1 |
| 5 | A11896-00 | MMA Solvent Fitting | 1 |
| 6 | 79001-06 | O-Ring Solvent Proof | 1 |
| 7 | A11252-01 | Tubing, 3/32" OD X 1/16" ID | 13 1/2" |
| 8 | A11305-00 | Lower Ferrule | 2 |
| 9 | A11276-00 | Fitting, Solvent | 1 |

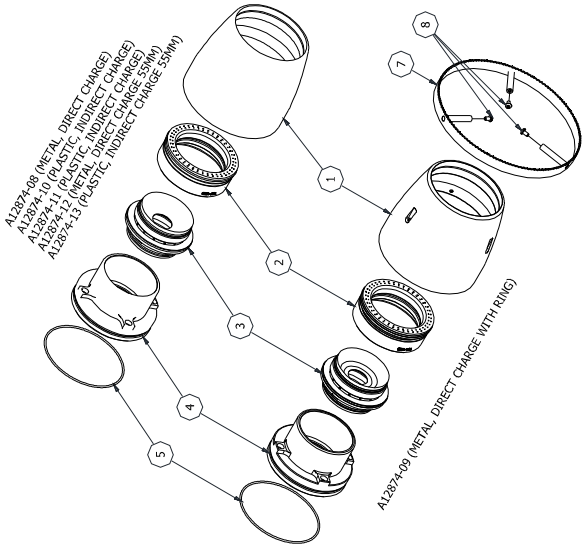
**NOTES:**

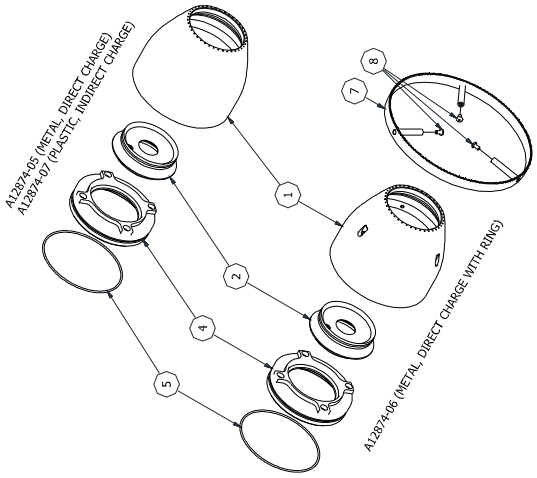
3 Apply A11545-00 lubricant onto all O-rings before installation.

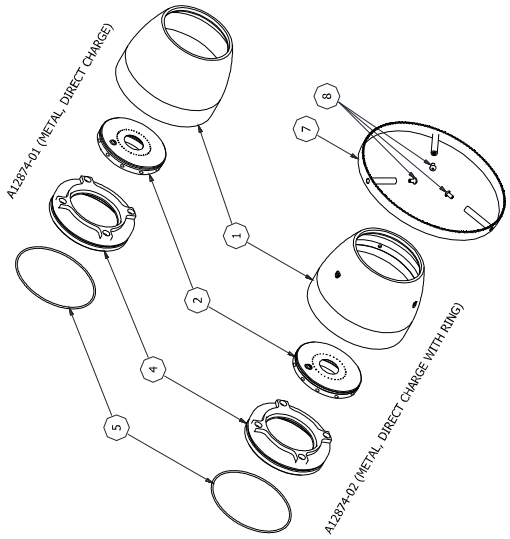
2 Torque to 15-20 lbs•in (2.82-3.95 Nm).

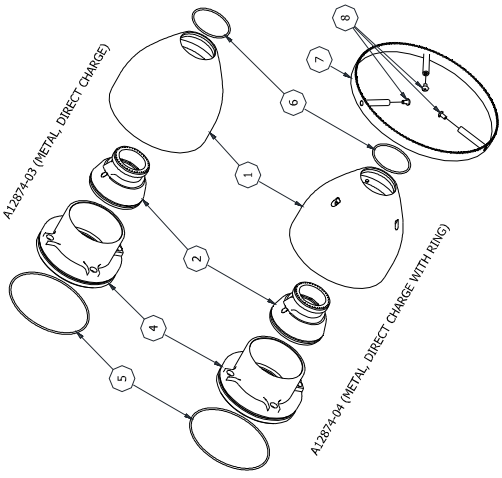
1 Torque to 15-20 lbs•in (2.82-3.95 Nm) after valve is down.

## PARTS IDENTIFICATION (Cont.)



## PARTS IDENTIFICATION (Cont.)

**SHAPING AIR KIT ASSEMBLY PARTS BREAK-DOWN**

| Part # | Description | A | B | C | D | E | N | P | R | S |
|---|---|---|---|---|---|---|---|---|---|---|
| A12874-01 | Direct Charge, 55mm | A11244-01 | A12872-00 | - | A12078-01 | - | - | - | - | - |
| A12874-02 | Direct Charge with Repulsion Ring, 55mm | A11725-01 | A12872-00 | - | A12078-01 | A11945-02 | - | - | 1 | 3 |
| A12874-03 | Direct Charge, 30mm | A11967-00 | A12873-00 | - | A12066-01 | - | - | 1 | - | - |
| A12874-04 | Direct Charge with Repulsion Ring, 30mm | A11967-01 | A12873-00 | - | A12066-01 | A11945-00 | - | 1 | 1 | 3 |
| A12874-05 | Direct Charge, Mono Flex | A12068-01 | A12083-01 | - | A12078-01 | - | - | - | - | - |
| A12874-06 | Direct Charge with Repulsion Ring, Mono | A12068-02 | A12083-01 | - | A12078-01 | A11945-01 | - | - | 1 | 3 |
| A12874-07 | Indirect Charge, Mono Flex | A12068-03 | A12083-02 | - | A12078-02 | - | - | - | - | - |
| A12874-08 | Direct Charge, Dual Flex | A12074-01 | A12084-01 | A12871-01 | A12066-01 | - | 1 | - | - | - |
| A12874-09 | Direct Charge with Repulsion Ring, Dual | A12074-02 | A12084-01 | A12871-01 | A12066-01 | A11945-02 | 1 | - | 1 | 3 |
| A12874-10 | Indirect Charge, Dual Flex | A12074-03 | A12084-02 | A12872-02 | A12066-02 | - | 1 | - | - | - |
| A12874-11 | Indirect Charge, Dual Flex TFE | A12932-00 | A12084-02 | A12871-02 | A12066-02 | | 1 | | | |
| A12874-12 | Direct Charge, Dual Flex 55mm | A13116-01 | A13229-01 | A13228-01 | A12066-01 | - | 1 | - | - | - |
| A12874-13 | Direct Charge, Dual Flex | A13116-02 | A13229-02 | A13228-02 | A12066-02 | | 1 | | | |

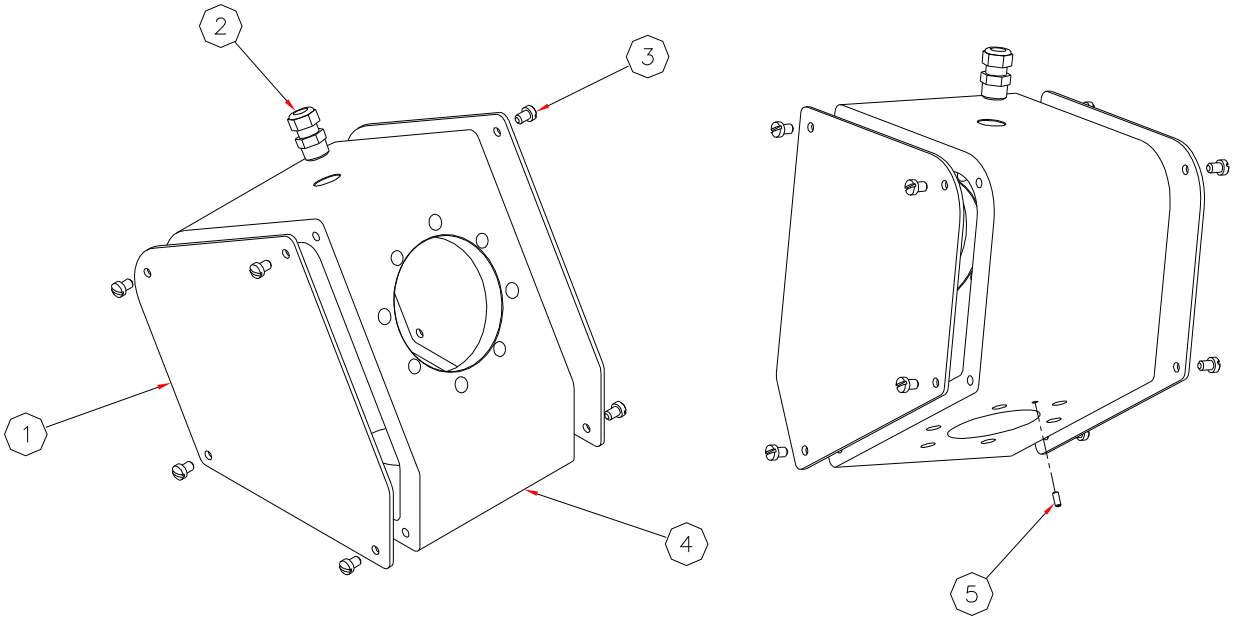
## PARTS IDENTIFICATION (Cont.)

| SHAPING AIR KIT - PARTS LIST | | | |
|---|---|---|---|
| **Item #** | **Part #** | **Description** | **Qty** |
| 1 | **A** | Outer Shroud | 1 |
| **2** | **B** | Shaping Air Ring | 1 |
| **3** | **C** | Inner Shaping Air Ring | **N** |
| 4 | **D** | Turbine Retaining Ring | 1 |
| 5 | 79001-11 | O-Ring, Solvent Proof | 1 |
| 6 | 79001-52 | O-Ring, Solvent Proof | **P** |
| 7 | **E** | Repulsion Ring | **R** |
| 8 | 77580-08C | Screw, 6-32X1/4" LG Button Cap Screw, SS | **S** |

**NOTE** - Set screw for all shaping air configurations is A12253-00.

| TUBING BUNDLE NOMENCLATURE | |
|---|---|
| SAO | Shaping Air, #2 |
| SAI | Shaping Air, #1 |
| BA | Bearing Air Supply |
| BRG, RTN | Bearing Air Return |
| PD | Dump Trigger |
| DL | Dump Out |
| PT | Paint Trigger |
| P | Paint Supply |
| ST | Solvent Trigger |
| SOL | Solvent Supply |
| TA | Turbine Air Supply |
| LV | Low Voltage Cable Port |
| FO | Fiber Optic Cable Port |
| CWA | Cup Wash Air |
| ATI | Cup Wash Air Trigger |
| BRK | Brake Air |

## PARTS IDENTIFICATION (Cont.)




| ADAPTER ASSEMBLY PARTS | |
|---|---|
| **Part #** | **Adapt To** |
| A10861-00 | Fanuc Robot (P-200) |
| A10861-01 | Fanuc Robot (P-145, P-155, P-70) |
| A10862-00 | ABB Robot |
| A10885-00 | Kawasaki Robot |
| A11931-00 | Motoman (2900) |

| ADAPTER ASSEMBLY REPLACEMENT - PARTS LIST | | | |
|---|---|---|---|
| **Item #** | **Part #** | **Description** | **Qty.** |
| 1 | **Table D - "C"** | Cover | 2 |
| 2 | 78803-00 | Fitting | 1 |
| 3 | LSFA00041-12C | Screw, 1/4-20 X 3/8" Long Fillister HD | 8 |
| 4 | **Table D - "A"** | Adapter Body | 1 |
| 5 | **Table D - "B"** | Alignment Pin | 1 |

| TABLE D - ROBOT ADAPTER STYLE | | | | |
|---|---|---|---|---|
| **Part #** | **Description** | **"A"** | **"B"** | **"C"** |
| A10861-00 | Fanuc (P-200) | A10859-00 | 77927-00 | A10860-00 |
| A10861-01 | Fanuc (P-145, P-155, P-70) | A11561-00 | (Not Used) | A10860-00 |
| A10862-00 | ABB | A10858-00 | (Not Used) | A10860-00 |
| A10885-00 | Kawasaki | A10884-00 | (Not Used) | A10860-00 |
| A11931-00 | Motoman (2900) | A11929-00 | A10850-00 | A11930-00 |

## PARTS IDENTIFICATION (Cont.)

| MMA-303 RECOMMENDED SPARE PARTS | | |
|---|---|---|
| **Part #** | **Description** | **Qty** |
| A11555-00 | Air Stud, Small | 2-3 |
| A11556-00 | Air Stud, Medium | 2-3 |
| A11557-00 | Air Stud, Large | 2-3 |
| 78265-00 | Fitting, 6mm, AN | 1-2 |
| 78269-00 | Ferrule, Front, 6mm | 1-2 |
| 78270-00 | Ferrule, Back, 6mm | 1-2 |
| 78273-00 | Nut, 6mm | 0-1 |
| 77762-01 | Collet, 6mm | 2-4 |
| 77516-04 | Collet, 4mm | 2-4 |
| 77762-04 | Collet, 8mm | 2-4 |
| 77762-02 | Collet, 10mm | 1-2 |
| 77536-04 | Tubing, 5/32" OD X .106" ID, Blue Nylon | -- |
| 77536-03 | Tubing, 5/32" OD X .106" ID, Green Nylon | -- |
| 77536-06 | Tube, 4mm OD X 2.7mm ID, Gray/Silver Nylon | -- |
| 77536-07 | Tube, 4mm OD X 2.7mm ID, Yellow Nylon | -- |
| 77536-08 | Tube, 4mm OD X 2.7mm ID, Orange Nylon | -- |
| A10839-06 | Tube, 10mm OD X 8mm ID, Green | -- |
| A10893-04 | Tube, 8mm OD X 6mm ID, Gray Nylon | -- |
| A10893-07 | Tube, 8mm OD X 6mm ID, Blue Nylon | -- |
| A10840-08 | Tube, 6mm OD X 4mm ID, Yellow Nylon | -- |
| A10840-09 | Tube, 6mm OD X 4mm ID, Orange Nylon | -- |
| A10840-06 | Tube, 6mm OD X 4mm ID, Green Nylon | -- |
| A10841-01 | Tubing, 10mm OD X 8mm ID, PFA, | -- |
| A10841-02 | Tubing, 8mm OD X 6mm ID, PFA, | -- |
| A10841-03 | Tubing, 6mm OD X 4mm ID, PFA, | -- |
| 78268-00 | Screw, Socket Head Cap, 10mm X 1.5" | 4-6 |
| A12409-XX | Fiber Optic Cable | 4-6 |
| A10560-XX | High Voltage Cable Assembly | 1 |
| 78375-XX | Cable, High Voltage Ground | 1 |
| A11283-00 | Solvent Circulation Line Assembly | 1 |
| A11531-00 | Fiber Optic Transmitter Assembly | 1 |

## PARTS IDENTIFICATION (Cont.)

| MMA-303 RECOMMENDED SPARE PARTS (Cont.) | | |
|---|---|---|
| **Part #** | **Description** | **Qty** |
| 78278-00 | Nut, Fiber Optic Tensioning | 0-1 |
| A12079-00 | High Voltage Ring | 0-1 |
| A11318-00 | Locknut, High Voltage Tube | 0-1 |
| A11317-00 | Bent Tube | 0-1 |
| A12895-XX * | Spindle Assembly | 0-1 |
| A11245-00 | Fluid Tube Assembly | 0-1 |
| 78949-00 | Valve Assembly | 2-4 |
| 77367-00 | Valve Seat Assembly | 2-4 |
| A11252-01 | Tubing, 3/32" OD X 1/16" ID, FEP | -- |
| A11269-00 | Splash Plate Assembly | 1 |
| A11276-00 | Fitting, Solvent, Cup wash | 1-2 |
| 79001-05 | O-Ring, Solvent Proof | 2-4 |
| 79001-06 | O-Ring, Solvent Proof | 3-5 |
| A11305-00 | Lower Ferrule | 2-4 |
| A11534-01 | O-Ring Kit (Turbine - Exterior, 5 O-Rings) | 1 |
| A11896-00 | MMA-303 Solvent Fitting | 1-2 |
| A12253-00 | Set Screw (Shaping Air) | 1-2 |
| ***Select Option Below - Electrode*** | | |
| A11343-02 | Electrode Assembly, 220 Megohm | 1-2 |
| A11343-03 | Electrode Assembly, 140 Megohms | 1-2 |
| A11342-00 | Electrode Body Assembly, No Resistor | 1-2 |
| ***Select Option Below - O-Ring*** | | |
| 79001-07 | O-Ring, Solvent Proof | 2-4 |
| 79001-11 | O-Ring, Solvent Proof | 2-4 |
| 79001-22 | O-Ring, Solvent Proof | 1-2 |
| 79001-30 | O-Ring, Solvent Proof | 5-10 |
| 79001-31 | O-Ring, Solvent Proof | 2-4 |
| 79001-32 | O-Ring, Solvent Proof | 3-5 |
| 79001-34 | O-Ring, Solvent Proof | 2-4 |
| 79001-39 | O-Ring, Solvent Proof | 2-4 |
| 79001-40 | O-Ring, Solvent Proof | 3-5 |
| 79001-41 | O-Ring, Solvent Proof | 1 |
| 79001-42 | O-Ring, Solvent Proof | 1 |
| 79001-44 | O-Ring, Solvent Proof | 1 |
| 79001-45 | O-Ring, Solvent Proof | 6-12 |
| LSOR0005-12 | O-Ring, | 1 |
| 79001-33 | O-Ring, Solvent Proof | 1-2 |

*** Customer must verify spindle part number located on outer housing, see page 12.**

## PARTS IDENTIFICATION (Cont.)

| MMA-303 RECOMMENDED SPARE PARTS (Cont.) | | |
|---|---|---|
| **Part #** | **Description** | **Qty** |
| ***Select Option Below - Fluid Tip*** | | |
| A11240-01 | Fluid Tip, .028/.7mm Opening | 0-1 |
| A11240-02 | Fluid Tip, .035/.9mm Opening | 0-1 |
| A11240-03 | Fluid Tip, .043/1.1mm Opening | 0-1 |
| A11240-04 | Fluid Tip, .047/1.2mm Opening | 0-1 |
| A11240-05 | Fluid Tip, .062/1.57mm Opening | 0-1 |
| A11240-06 | Fluid Tip, .039/1.0mm Opening | 0-1 |
| ***Select Option Below - Bell Cup Assembly W/Splash Plate*** | | |
| A11730-00 | 55mm Titanium Serrated (TISF) | 1 |
| A11730-01 | 55mm Titanium Non-Serrated (TIF) | 1 |
| A11783-00 | 55mm Aluminum Serrated (ALSF) | 1 |
| A11968-00 | 30mm Titanium Serrated (TIS) | 1 |
| A11968-01 | 30mm Aluminum Serrated (ALS) | 1 |
| A13114-00 | 55mm Titanium Serrated Dual Flex (single piece cup) (TISF) | 1 |
| A13114-01 | 55mm Titanium Non-Serrated Dual Flex (single piece cup) (TIF) | 1 |
| A12900-00 | 65mm Titanium Serrated (single piece cup) (TISF) | 1 |
| A12900-01 | 65mm Titanium Non-Serrated (single piece cup) (TIF) | 1 |
| A12900-02 | 65mm Titanium Serrated Long Life Splash Plate (TISF) Single Piece Cup | 1 |
| A12900-03 | 65mm Titanium Non-Serrated Long Life Splash Plate (TIF)Single Piece Cup | 1 |
| A12900-04 | 65mm Aluminum Serrated Plastic Splash Plate Single Piece Cup | 1 |
| A12900-05 | 65mm Aluminum Non-Serrated Plastic Splash Plate Single Piece Cup | 1 |
| ***Select Option Below - Bell Cup Only*** | | |
| A11732-00 | 55mm Titanium Serrated (TISF) | 1 |
| A12522-00 | 55mm Titanium Non-Serrated (TIF) | 1 |
| A11782-00 | 55mm Aluminum Serrated (ALSF) | 1 |
| A11964-00 | 30mm Titanium Serrated (TIS) | 1 |
| A11964-01 | 30mm Aluminum Serrated (ALS) | 1 |
| A13113-00 | 55mm Titanium Serrated, (Single Piece Cup) | 1 |
| A13113-01 | 55mm Non-Serrated (Single Piece Cup) | 1 |
| A12886-00 | 65mm Titanium Serrated (TISF) (Single Piece Cup) | 1 |
| A12886-01 | 65mm Titanium Non-Serrated (TIF) (Single Piece Cup) | 1 |
| A12886-02 | 65mm Aluminum Serrated (Single Piece Cup) | 1 |
| A12886-03 | 65mm Aluminum Non-Serrated (Single Piece Cup) | 1 |
| ***Select Option Below - Splash Plate Assembly*** | | |
| A11269-00 | For 55mm Bell Cups (White) | 1-2 |
| A11954-00 | For 30mm Bell Cups (White) | 1-2 |
| A12071-00 | For 65mm Bell Cups (Black) | 1-2 |
| A13004-00 | For 65mm Bell Cups Long Life Splash Plate (Black) | 1-2 |

## PARTS IDENTIFICATION (Cont.)

| MMA-303 RECOMMENDED SPARE PARTS (Cont.) | | |
|---|---|---|
| **Part #** | **Description** | **Qty** |
| ***Select Option Below - Shaping Air Kit A12874-01 (55mm)*** | | |
| A11244-00 | Outer Shroud, 55mm | 0-1 |
| A12872-00 | Shaping Air Ring, 55mm | 0-1 |
| A12078-01 | Turbine Retaining Ring | 0-1 |
| 79001-11 | O-Ring | 1 |
| ***Select Option Below - Shaping Air Kit A12874-03 (30mm)*** | | |
| A11967-00 | Outer Shroud | 0-1 |
| A12873-00 | Shaping Air Ring, 55mm | 0-1 |
| 79001-11 | O-Ring | 1 |
| 79001-37 | O-Ring | 1 |
| 79001-52 | O-Ring | 1 |
| ***Select Option Below - Shaping Air Kit A12874-04 (30mm) W/Repulsion Ring*** | | |
| A11967-01 | Outer Shroud | 0-1 |
| A12873-00 | Shaping Air Ring | 0-1 |
| A11945-02 | Repulsion Ring | 0-1 |
| 77580-08C | Screw | 3 |
| A12066-01 | Turbine Retaining Ring | 0-1 |
| 79001-11 | O-Ring | 1 |
| 79001-52 | O-Ring | 1 |
| 79001-37 | O-Ring | 1 |
| ***Select Option Below - Shaping Air Kit A12874-05 (Mono Flex)*** | | |
| A12068-01 | Outer Shroud | 0-1 |
| A12083-01 | Shaping Air Ring | 0-1 |
| A12078-01 | Turbine Retaining Ring | 0-1 |
| 79001-11 | O-Ring | 1 |
| 79001-37 | O-Ring | 1 |
| ***Select Option Below - Shaping Air Kit A12874-06 (Mono Flex) W/Repulsion Ring*** | | |
| A12068-02 | Outer Shroud | 0-1 |
| A12083-01 | Shaping Air Ring | 0-1 |
| A12078-01 | Turbine Retaining Ring | 0-1 |
| A11945-01 | Repulsion Ring | 0-1 |
| 77580-08C | Screw | 0-1 |
| 79001-11 | O-Ring | 1 |
| 79001-37 | O-Ring | 1 |
| 79001-54 | O-Ring | 1 |

## PARTS IDENTIFICATION (Cont.)

| MMA-303 RECOMMENDED SPARE PARTS (Cont.) | | |
|---|---|---|
| **Part #** | **Description** | **Qty** |
| ***Select Option Below - Shaping Air Kit A12874-07 Shaping Air Parts (Indirect)*** | | |
| A12068-03 | Outer Shroud (Mono Flex) | 0-1 |
| A12083-02 | Shaping Air Ring Assembly (Mono Flex) | 0-1 |
| A12078-02 | Turbine Retaining Ring (Mono Flex) | 0-1 |
| 79001-11 | O-Ring | 1 |
| 79001-37 | O-Ring | 1-2 |
| ***Select Option Below - Shaping Air Kit A12874-08 (Dual Flex)*** | | |
| A12074-01 | Outer Shroud | 0-1 |
| A12084-01 | Shaping Air Ring | 0-1 |
| A12871-01 | Inner Shaping Air Ring | 0-1 |
| 79001-11 | O-Ring | 1 |
| 79001-37 | O-Ring | 1-2 |
| 79001-54 | O-Ring | 1 |
| A12066-01 | Turbine Retaining Ring | 0-1 |
| ***Select Option Below - Shaping Air Kit A12874-09(Dual Flex) W/ Repulsion Ring*** | | |
| A12074-02 | Outer Shroud | 0-1 |
| A12084-01 | Shaping Air Ring | 0-1 |
| A12066-01 | Turbine Retaining Ring | 0-1 |
| A12871-01 | Inner Shaping Air Ring | 0-1 |
| A11945-02 | Repulsion Ring | 0-1 |
| 77580-08C | Screw | 3 |
| 79001-11 | O-Ring | 1 |
| 79001-37 | O-Ring | 1-2 |
| 79001-54 | O-Ring | 1 |
| ***Select Option Below - Shaping Air Kit A12874-10 Shaping Air Parts (Indirect)*** | | |
| A12074-03 | Outer Shroud (Dual Flex) | 0-1 |
| A12084-02 | Shaping Air Ring (Dual Flex) | 0-1 |
| A12871-02 | Inner Shaping Air Ring (Dual Flex) | 0-1 |
| A12066-02 | Turbine Retaining Ring (Dual Flex) | 0-1 |
| 79001-54 | O-Ring | 1 |
| 79001-11 | O-Ring | 1 |
| 79001-37 | O-Ring | 1-2 |
| ***Select Option Below - Shaping Air Kit A12874-11 Shaping Air Parts (Indirect)*** | | |
| A12932-00 | Outer Shroud (Dual Flex) Plastic (TFE) | 0-1 |
| A12084-02 | Shaping Air Ring (Dual Flex) | 0-1 |
| A12871-02 | Inner Shaping Air Ring (Dual Flex) | 0-1 |
| A12066-02 | Turbine Retaining Ring (Dual Flex) | 0-1 |
| 79001-54 | O-Ring | 1 |
| 79001-11 | O-Ring | 1 |
| 79001-37 | O-Ring | 1-2 |

## PARTS IDENTIFICATION (Cont.)

**MMA-303 RECOMMENDED SPARE PARTS (Cont.)**

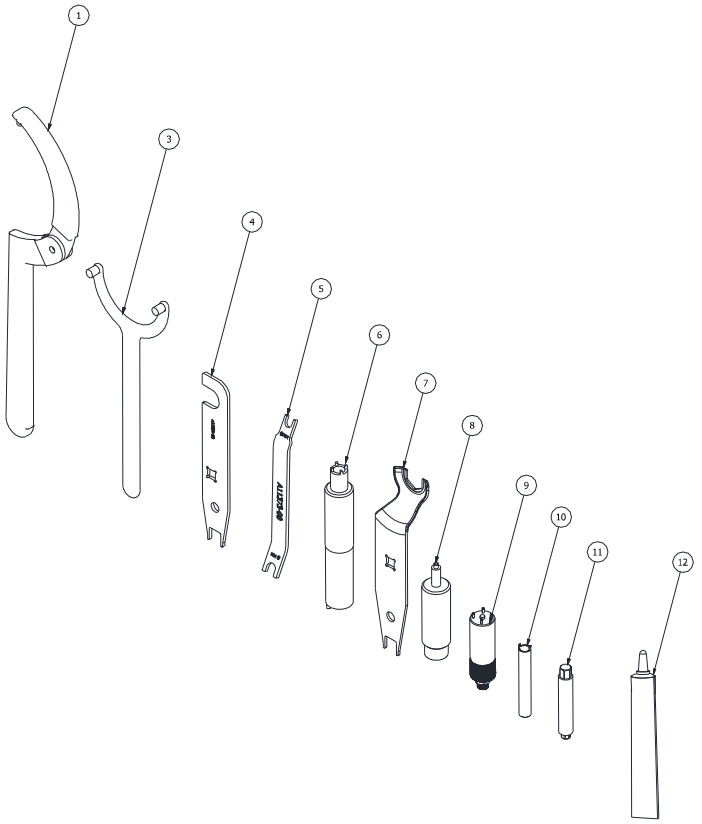
| ***Select Option Below - Shaping Air Kit A12874-12 (55mm Dual Flex Direct Charge)*** | | |
|---|---|---|
| A13116-01 | Outer Shroud | 0-1 |
| A13229-01 | Shaping Air Ring | 0-1 |
| A12066-01 | Turbine Retaining Ring | 0-1 |
| A13228-01 | Inner Shaping Air Ring | 0-1 |
| A12066-01 | Turbine Retaining Ring | 0-1 |
| 79001-11 | O-Ring | 1 |

| ***Select Option Below - Shaping Air Kit A12874-13 (55mm Dual Flex Indirect Charge)*** | | |
|---|---|---|
| A13116-02 | Outer Shroud | 0-1 |
| A13229-02 | Shaping Air Ring | 0-1 |
| A12066-02 | Turbine Retaining Ring | 0-1 |
| A13228-02 | Inner Shaping Air Ring | 0-1 |
| A12066-02 | Turbine Retaining Ring | 0-1 |
| 79001-11 | O-Ring | 1 |

| ***Select Option Below - Shaping Air Kit A12874-02 (55mm) W/Repulsion Ring*** | | |
|---|---|---|
| A11725-00 | Outer Shroud | 0-1 |
| A12872-00 | Shaping Air Ring | 0-1 |
| A11945-02 | Repulsion Ring | 0-1 |
| A12078-01 | Turbine Retaining Ring | 0-1 |
| 79001-11 | O-Ring | 1 |
| LSOR0005-12 | O-Ring | 1 |
| 77580-08C | Screw | 3 |

# N O T E S

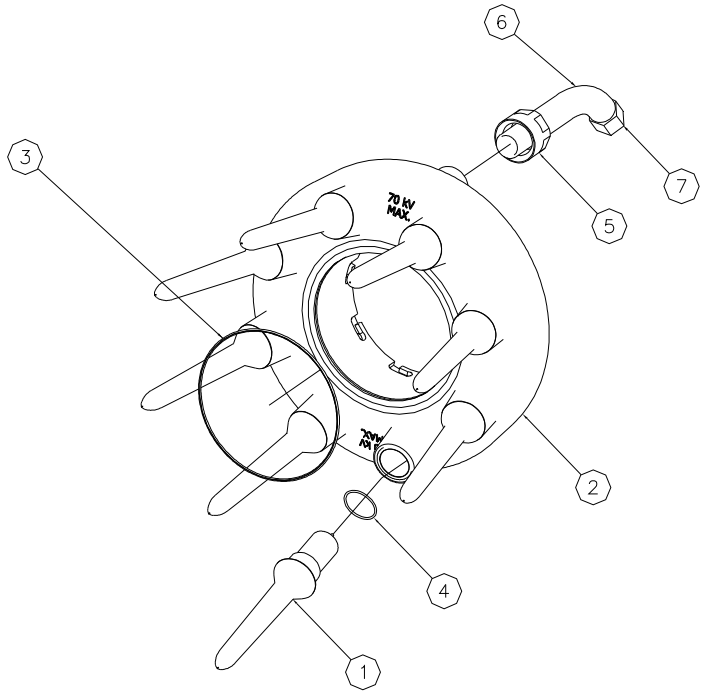
## PARTS IDENTIFICATION (Cont.)




| ASSEMBLY TOOL KIT | A | B | DESCRIPTION |
|---|---|---|---|
| A12090-01 | 1 | 0 | 55MM STANDARD |
| A12090-02 | 0 | 1 | 30 MM AND 65MM |

| BILL OF MATERIALS | | | |
|---|---|---|---|
| ITEM | QTY | PART NUMBER | DESCRIPTION |
| 1 | 1 | 76772-00 | WRENCH, SPANNER |
| 2 | - | - | - |
| 3 | 1 | A12088-00 | WRENCH, TURBINE RETAINING RING |
| 4 | A | A11284-00 | BELL CUP / COMBO WRENCH |
| 5 | 1 | A11373-00 | TOOL, TUBING REMOVAL (RMA-303 INDIRECT) |
| 6 | 1 | A11229-00 | TOOL, FLUID TIP/TUBE REMOVAL |
| 7 | B | A12061-00 | WRENCH, BELL CUP |
| 8 | 1 | A11388-00 | TOOL, SPLASH PLATE REMOVAL |
| 9 | 1 | A11922-00 | TOOL, VALVE REMOVAL |
| 10 | 1 | 78279-00 | TOOL, FIBER OPTIC |
| 11 | 1 | A10766-00 | TOOL, VALVE SEAT REMOVAL |
| 12 | 1 | LSCH0009-00 | DI-ELECTRIC GREASE, 0.88 OZ. |

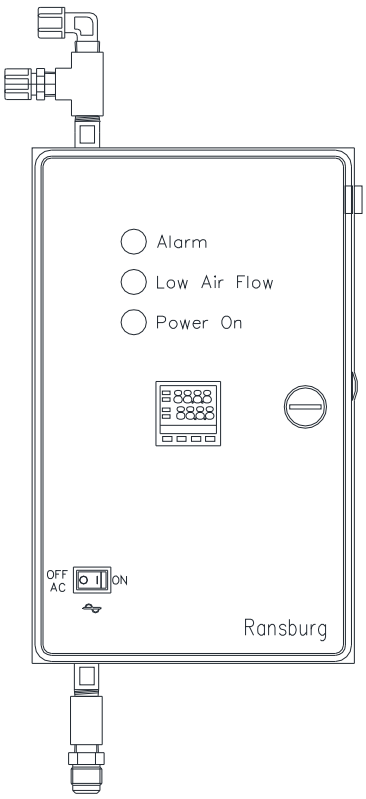
## PARTS IDENTIFICATION (Cont.)



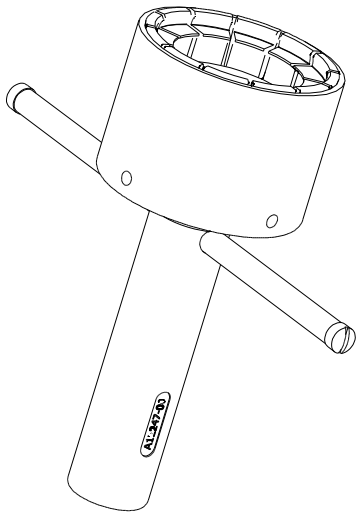

| A11536-XX HIGH VOLTAGE RING KIT - PARTS LIST | | | |
|---|---|---|---|
| **Item #** | **Part #** | **Description** | **Qty** |
| 1 | **“ A”** | Electrode Assembly | 8 |
| 2 | A12079-00 | High Voltage Ring | 1 |
| 3 | LSOR0005-14 | O-Ring, Encapsulated | 1 |
| 4 | 79001-45 | O-Ring | 8 |
| 5 | A11318-00 | Locknut, High Voltage Tube | 1 |
| 6 | A11317-00 | Bent Tube | 1 |
| 7 | 78441-00 | Ferrule Nut, 3/8" OD | 1 |

| ELECTRODE ASSEMBLY - PARTS LIST | | |
|---|---|---|
| **Part #** | **A** | **Description** |
| A11536-00 | A11343-02 | At Sea Level |
| A11536-01 | A11343-03 | At 5000 Ft. Above Sea Level or Higher |

## PARTS IDENTIFICATION (Cont.)




**A11065-05 Air Heater**



**A12247-00 Bell Cup Tool**

| ACCESSORIES | |
|---|---|
| **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 spray ability. 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 (76667-00), Paint Probe Assembly (7922-00), Test Lead Assembly (76664-00), and High Voltage Probe Assembly (76667-00) |
| A11065-05 | Air Heater |
| A11565-00 | White Stretch Lint Free Covers |
| A11564-00 | Foam Elastic Covers (Green) |
| A12247-00 | Bell Cup Removal Tool |
| 78809-00 | Ground Resistor Assembly (110 megohms) |
| 78842-00 | In-Line Resistor Assembly (40 megohms) |

## PARTS IDENTIFICATION (Cont.)

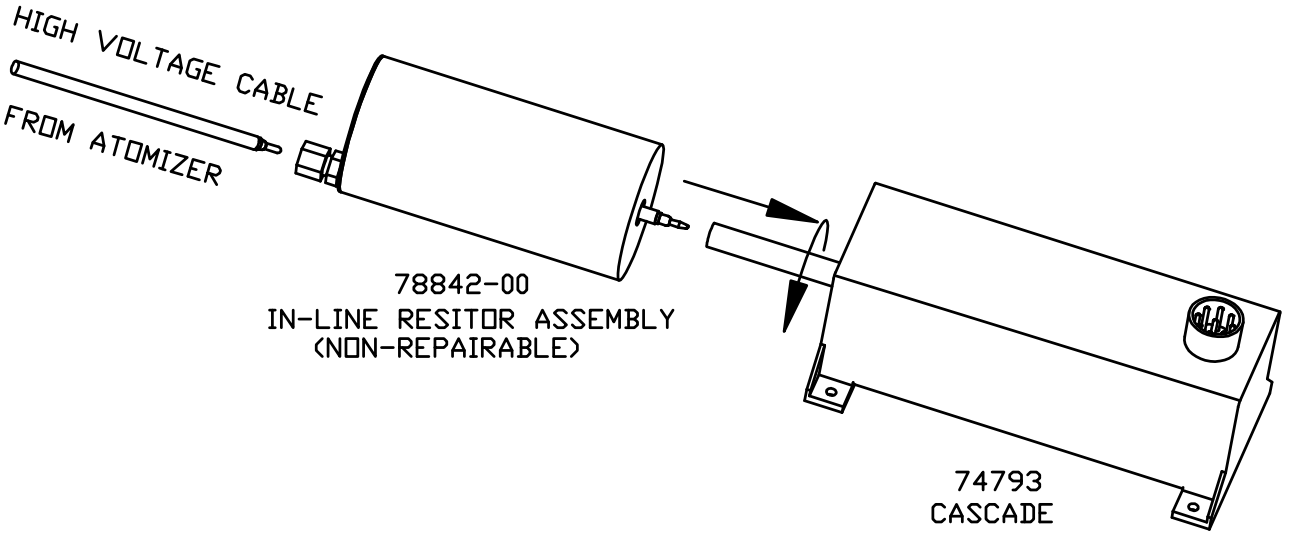
| SERVICE KITS | |
|---|---|
| **Part #** | **Description** |
| RPM-32 | Pro-Filter Replacement Element |
| RPM-33 | Bearing Air Filter Element |
| 74947-06 | Cable Assembly (Low Voltage Cable), 30 Ft. |
| 74947-04 | Cable Assembly (Low Voltage Cable), 75 Ft. |
| 74947-05 | Cable Assembly (Low Voltage Cable), 100 Ft. |
| 74793-01 | Cascade RansPak 1000, Right Angle Connection |
| 74793-02 | Cascade RansPak 1000, Straight Connection |
| A11570-01 | Reducing Straight Connector, Push to Connect, 6mm OD Tube to 4mm OD Tube |
| A11570-02 | Reducing Straight Connector, Push to Connect, 8mm OD Tube to 4mm OD Tube |
| A11570-03 | Reducing Straight Connector, Push to Connect, 8mm OD Tube to 6mm OD Tube |
| A11570-04 | Reducing Straight Connector, Push to Connect, 10mm OD Tube to 4mm OD Tube |
| A11570-05 | Reducing Straight Connector, Push to Connect, 10mm OD to 6mm OD Tube |
| A11570-06 | Reducing Straight Connector, Push to Connect, 10mm OD to 8mm OD Tube |
| A11570-07 | Reducing Straight Connector, Push to Connect, 12mm OD to 8mm OD Tube |
| A11570-08 | Reducing Straight Connector, Push to Connect, 12mm OD to 10mm OD Tube |
| 77762-03 | Collet, 12mm |
| A12138-01 | Nut, 8mm |
| A13294 | Fitting, 8mm ODTX AN |
| A12138-03 | Ferrule, Rear 8mm |
| A12138-02 | Ferrule, Front 8mm |

| LUBRICANTS AND SEALERS | |
|---|---|
| **Part #** | **Description** |
| A11545-00 | Petrolatum Jell Lubricant for All O-Rings |
| 7969-031 | Thread Sealant (Blue), |
| 7969-10 | Thread Sealant (White), |

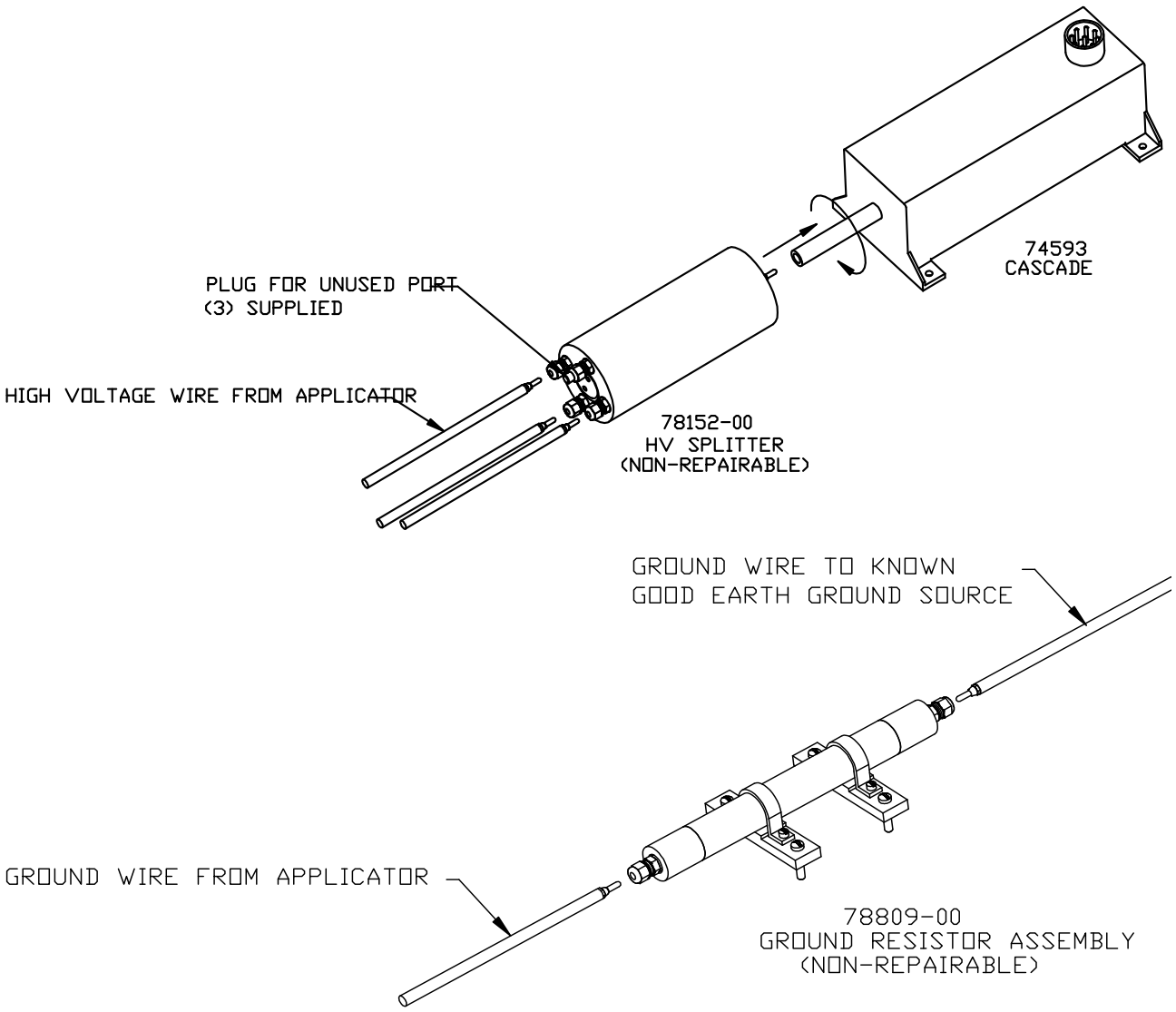
| HIGH VOLTAGE CABLE LENGTH | |
|---|---|
| **Part #** | **Description** |
| A10560-16 | High Voltage Cable Assy., Shielded, Non-Metallic Cen. Cond., 15 Ft. |
| A10560-20 | High Voltage Cable Assy., Shielded, Non-Metallic Cen. Cond., 20 Ft. |
| A10560-25 | High Voltage Cable Assy., Shielded, Non-Metallic Cen. Cond., 25 Ft. |
| A10560-50 | High Voltage Cable Assy., Shielded, Non-Metallic Cen. Cond., 50 Ft. |
| A10560-75 | High Voltage Cable Assy., Shielded, Non-Metallic Cen. Cond., 75 Ft. |
| A10560-100 | High Voltage Cable Assy., Shielded, Non-Metallic Cen. Cond., 100 Ft. |

## PARTS IDENTIFICATION (Cont.)

| FIBER OPTIC CABLE LENGTH | |
|---|---|
| **Part #** | **Description** |
| A12409-01 | Fiber Optic Cable Assembly, 3 Ft. |
| A12409-02 | Fiber Optic Cable Assembly, 6 Ft. |
| A12409-03 | Fiber Optic Cable Assembly, 10 Ft. |
| A12409-04 | Fiber Optic Cable Assembly, 15 Ft. |
| A12409-05 | Fiber Optic Cable Assembly, 25 Ft. |
| A12409-06 | Fiber Optic Cable Assembly, 40 Ft. |
| A12409-07 | Fiber Optic Cable Assembly, 50 Ft. |
| A12409-08 | Fiber Optic Cable Assembly, 65 Ft. |
| A12409-09 | Fiber Optic Cable Assembly, 75 Ft. |
| A12409-10 | Fiber Optic Cable Assembly, 100 Ft. |



## PARTS IDENTIFICATION (Cont.)




| REPLACEMENT HARDWARE | |
|---|---|
| **Part #** | **Description** |
| LSFA0004-40C | Screw, 1/4-20 X 1.25 X 1.25", Fillister Head, Nylon |
| 77302-16F | Screw, 10-31 X 1/2", Fillister Head, Nylon |
| 78805-00 | Clamp Block |
| 78804-00 | Clamp |

## Changes Made

**Changes made to LN-9269-11.3 Service Manual:**

- Page 102- Added dash no.'s 14 & 15 to Table "A".
- Page 106 - Added Bell Cup Assembly A12900-04 and A12900-5
- Page 116- Added Bell Cup Assembly w/ Splash Plate A12900-04 and A12900-05.
- Page 116 - Added A12886-02 &-03 Bell Cups Only.

# WARRANTY POLICIES

## LIMITED WARRANTY

Ransburg will replace or repair without charge any part and/or equipment that falls 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, VOID 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, ASSOCIATED VALVES AND TUBING, AND SUPPORTING HARDWARE IN PLASTIC, SHRINK-WRAP, OR ANY OTHER NON-APPROVED COVERING, WILL VOID THIS WARRANTY.**

**RANSBURG'S ONLY OBLIGATION UNDER THIS WARRANTY IS TO REPLACE PARTS THAT HAVE FAILED BECAUSE OF FAULTY WORKMANSHIP OR MATERALS. 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.

# Ransburg

**Manufacturing**

1910 North Wayne Street

Angola, Indiana 46703-9100

Telephone: 260-665-8800

Fax: 260-665-8516

**Technical Service — Assistance**

320 Philips Ave.

Toledo, Ohio 43612-1493

Telephone (toll free): 800-233-3366

Fax: 419-470-2233

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



Form No. LN-XXXX-00
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