S e r v i c e M a n u a l

ICE BELL ROTARY ATOMIZER

Model RPM-6093-PSE

For the Application of Waterborne Paints

Before using this equipment, carefully read the Safety and Safety Precautions sections and all instructions in this manual. Keep this Service Manual for future reference.

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Content

Content (Cont)

1 Safety

1.1 Safety Precautions

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

WARNING

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

CAUTION

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

NOTE

Important information relevant to the procedure in progress.

WARNING

- The user MUST read and be familiar with the Safety Section in this manual and the ITW 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, 2000 EDITION, prior to installing, operating, and/or servicing this equipment.
- The hazards shown on the following page may occur during the normal use of this equipment. Please read the hazard chart beginning on page 5.

Hazardous Areas and Precautions

AREA Tells where hazards may occur	***HAZARD*** Tells what the hazard is	***SAFEGUARDS*** Tells how to avoid the hazard
Spray Area 	Fire Hazard Improper or inadequate operation and maintenance procedures will cause a fire hazard. 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 shutdown indicates a problem in the system requiring correction.	Fire extinguishing equipment must be present in the spray area and tested periodically. Spray areas must be kept clean to prevent the accumulation of combustible residues. Smoking must never be allowed in the spray area. The high voltage supplied to the atomizer must be turned off prior to cleaning, flushing or maintenance. When using solvents for cleaning: Those used for equipment flushing should have flash points equal to or higher than those of the coating material. Those used for general cleaning must have flash points above 37.8˚C. Spray booth ventilation must be kept at the rates required by the European regulations In addition, ventilation must be maintained during cleaning operations using flammable or combustible solvents. Electrostatic arcing must be prevented. Test only in areas free of combustible material. Testing may require high voltage to be on, but only as instructed. Non-factory replacement parts or unauthorized equipment modifications may cause fire or injury. If used, the key switch by-pass is intended for use only during set-up operations. Production should never be done with safety interlocks disabled. Never use equipment intended for use in waterborne installations to spray solvent based materials.
General Use and Maintenance	Improper operation or maintenance may create a hazard. Personnel must be properly trained in the use of this equipment.	Personnel must be given training in accordance with the requirements of the European regulations. Instructions and safety precautions must be read and understood prior to using this equipment. Comply with appropriate local, state, and national codes governing ventilation, fire protection, operation maintenance, and housekeeping.

Hazardous Areas and Precautions (cont.)

AREA Tells where hazards may occur	***HAZARD*** Tells what the hazard is	***SAFEGUARDS*** Tells how to avoid the hazard
Electrical Equipment 	High voltage equipment is utilized. Arcing in areas of flammable or combustible materials may occur. Personnel are exposed to high voltage during operation and maintenance. Protection against inadvertent arcing that may cause a fire or explosion is lost if safety circuits are disabled during operation. Frequent power supply shut-down indicates a problem in the system which requires correction. An electrical arc can ignite coating materials and cause a fire or explosion.	The power supply, optional remote control cabinet, and all other electrical equipment must be located outside Class I or II, Division 1 and 2 hazardous areas. Turn the power supply OFF before working on the equipment. Test only in areas free of flammable or combustible material. Testing may require high voltage to be on, but only as instructed. Production should never be done with the safety circuits disabled. Before turning the high voltage on, make sure no objects are within the sparking distance.
Explosion Hazard / incompatible Materials 	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 material supplier. Any other type of solvent may be used with aluminum equipment.
Toxic Substances 	Certain material 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. Adequate exhaust must be provided to keep the air free of accumulations of toxic materials. 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.

Hazardous Areas and Precautions (cont.)		
AREA Tells where hazards may occur	***HAZARD*** Tells what the hazard is	***SAFEGUARDS*** Tells how to avoid the hazard
Spray Area / High Voltage Equipment 	There is a high voltage device that can induce an electrical charge on ungrounded objects which is capable of igniting coating materials. Inadequate grounding will cause a spark hazard. A spark can ignite many coating materials and cause a fire or explosion.	Parts being sprayed must be supported on conveyors or hangers and be grounded. The resistance between the part and ground must not exceed 1 megaΩ. 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. Any person working in the spray area must be grounded. Unless specifically approved for use in hazardous locations, the power supply and other electrical control equipment must not be used in Class 1, Division 1 or 2 locations.
Personnel safety/ Mechanical Hazards 	The bell atomizer can rotate at speeds up to 55,000 rpm. At these speeds, the edge of the applicator can easily cut into skin. Loose articles can also be caught by the rotating bell.	Personnel must stay clear of the bell whenever it is rotating. Before touching the bell, the turbine air must be shut off. If the bell has been rotating, allow at least two minutes for it to come to a complete stop before touching it.

2 Introduction

2.1 Features

Features which make the ICE Bell Rotary Atomizer advantageous for use in electrostatic applications include:

- CE listed. Limited energy is available to prevent ignition of flammable air/solvent mixtures.
- Assembly components and bell made of durable Titanium material for optimum mechanical strength and Water resistance.
- Proven long life turbine motor capable of speeds up to 55k rpm at minimal air consumption. See "Specifications" in the "Introduction" section of this manual for bell cup speed ratings.
- Patented serrated edge bell provides excellent atomization quality at minimal rotational speeds.
- 57mm and 30mm diameter bell assemblies available for application flexibility.
- Fast color changes are achieved using center feed fluid delivery, integral brake air, high flow regulator and the fluid valves which provide for simultaneous paint push out while solvent washes the feed tube and bell cup.
- Bell wash is quick and efficient. Solvent usage is controlled at the feed tube with an internally mounted solvent valve.
- Less waste to the spray booth, with the dump valve located internally next to the feed tube.
- Proven air coolers which brings the bell temperature below -15°C
- Easy to install and maintain. Hosing and connections are easily accessible at either the rear of the assembly or by sliding back the protective rear cover.
- Quick removal of the turbine assembly for off- line repair.
- Annular shaping air passage design providing excellent pattern control at minimal air consumption.
- Aerodynamic design for ease of cleaning external surfaces.
- Assembly can be swiveled to provide oblique spray angles for better paint coverage in difficult areas of the product.
- Turbine air exhausts behind bell, keeping paint and solvent contamination out of atomizer interior and keeping back of bell clean.
- Speed readout (or control) uses reliable magnetic pickup for fiber-optic transmission of rotational speed data.

3 General Description

3.1 ICE Bell System

The Ransburg Ice Bell is a high speed rotary atomizer system designed to meet agency safety requirements for safer operation.

The ICE Bell provides electrostatic application with excellent atomization and transfer efficiency for a wide variety of coating materials.

WARNING

The ICE Bell System is designed to provide safer operation in accordance with European regulations, when used and maintained in a proper manner. Equipment cleanliness and proper routine maintenance are required to maintain safe operating conditions.

3.2 High Voltage Cables

The SSW-1064, high voltage cable, is used to connect the power supply to the resistor module inside the atomizer assembly.

3.3 Speed Monitor/Control

The ICE Bell rotary atomizer is designed to operate with the ITW Ransburg PulseTrack™ or Atomizer Module for speed monitoring and/or speed control.

4 Specifications

4.1 Electrical

Power Supply Type:	Voltage master 2
Charging Method:	Direct
Output Voltage:	30-100 kV
Variable Output Current:	1000 µA (Short Circuit) Turbine Speed
Control:	PulseTrack or Eurocard Atomizer Module

4.2 Mechanical

Length:	419mm
Diameter:	142mm
Approximate Weight:	5.0 kg
Turbine Type:	Air Bearing Impulse Drive
Turbine Air Supply (Nominal):	at 30,000 rpm 3.5 bar maxi 0.5 m^3/ min
Maximum Turbine Speed:	Continuous (Intermittent) 30mm Bell Cup: 40,000 rpm (55,000 rpm) 57mm Bell Cup: 40,000 rpm (55,000 rpm)
Bearing Air Supply(Nominal):	5 bar nominal 7 bar maxi 0.1 m^3 / min
Shaping Air Supply (Nominal):	10 bar maxi 0.4 m^3 /min
Brake Air Supply (Nominal):	4 bar maxi
Maximum Fluid Pressure Supply:	7 bar maxi
Fluid Flow Rate:	25-500 cc/minute
Usable Spray Pattern Diameter:	381-762 mm
Bell Cup Cleaning Time:	Approximately 2-3 seconds
Color Change Time:	Dependent on system configuration, fluid pressure, fluid viscosity, fluid line lengths, etc.
Speed Readout:	Magnetic pickup, unidirectional fiber-optic transmission
Atomizer Replacement Time:	Less than 2 minutes
Bell Cup Replacement Time:	Less than 2 minutes

5 Installation

5.1 Air Filter Installation

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

- Use only recommended pre-filters and bearing air filters. Additional system air filtration (i.e. refrigerated air dryer) may also be used if desired.
- Mount the bearing air filter as close as possible to the ICE Bell. Do not mount further than 10 meters away!
- Do not use Teflon® tape, pipe dope, or other thread sealant downstream of the bearing air filter. Loose flakes of Teflon tape or other sealant can break loose and plug the very fine air holes in the turbine air bearings.

	Tube Size	Air Pressure Requirements
Bearing Air Supply (B.A)	1/4" O.D.	6 bar maxi
Bearing Air Return (B.A)	1/4" O.D.	5.5 bar
Turbine Air (T.A)	1/2" O.D.	Variable
Shaping Air (S.A)	3/8" O.D.	Variable
Brake Air (BRK) (if used)	3/8" O.D.	4 bar
Trigger Valve Control (TV)	1/4" O.D.	5.5 bar
Dump Valve Control (DV)	1/4" O.D.	5.5 bar
Solvent Valve Control (SV)	1/4" O.D.	5.5 bar

I: Air Tubing Connections

5.2 Air filtration Requirements

Air Filtration Requirements		
ITW Ransburg Filter Model No.	**Description / Specifications**	**Replacement Element Part No.**
HAF-503	Pre-filter, removes coarse amounts of oil, moisture & dirt. Used upstream of RPM-417 pre-filter (used in systems with poor air quality).	HAF-15 Element, One
RPM-417	Pre-filter, coalescing type, 136 scfm, 98.5% efficiency particulate removal .3 to .6 microns, max. aerosol passed 1.0 micron, max. solid passed .4 micron (dependent upon scfm requirement per applicator, one RPM-417 can be used with up to three Aerobell 33 assemblies).	RPM-32 Elements, Carton of 4
RPM-418	Bearing air filter, coalescing type, 19 scfm, 99.995% efficiency particulate removal .3 to .6 microns, max. aerosol passed .6 micron, max. solid passed .2 micron (one per applicator).	RPM-33 Elements, Carton of 8

II: Air Filtration Requirements

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 of filters must be used in an Ice Bell system. The filter elements must be replaced on a regular schedule to assure clean air.
- It is the user's responsibility to ensure clean air at all times. Turbine failure resulting from contaminated air will not be covered under warranty. The above shows the pre-filter and bearing air filter(s) which are recommended for use in AeroBell 33 systems. If other filters are incorporated in the system, the filters to be used must have filtering capacities equal or better than those shown above.
- The user must ensure the bearing air supply is not inadvertently turned off while the ICE Bell air motor is turning. This will cause air bearing failure.

5.3 Mounting

The ICE bell incorporates its own insulator mounting rod. The diameter at the rear is 49mm, for mounting to a reciprocator, stationary stand, or other means of support. The atomizer assembly is mounted to this horizontal rod by a 3/4 inch insulating post, inserted into a swivel clamp and secured by four plastic bolts. The arrangement allows positioning of the front of the turbine. Normally, the insulator support rod is positioned perpendicular to the conveyor path, with the swivel providing for left or right adjustment of the atomizer assembly. The swivel clamp plate can be inverted to provide a locking mechanism to hold the applicator in line with the insulator support rod.

5.4 Fluid Connections

The paint supply to the ICE Bell is connected at the rear of the atomizer assembly to the regulator. Solvent and dump line connections enter the housing and are connected to the appropriate valves. Ports are labeled with blue lettering.

5.5 Electrical Connections

Electrical connections to the ICE Bell atomizer assembly consist of only the high voltage cable. This cable plugs into the module fitting, located at the rear of the assembly.

After inserting the cable tighten the cable compression fitting nut around the high voltage cable with an appropriate wrench.

5.6 Speed Monitor Connections

A fiber-optic cable assembly connects the speed signal output of the rotary atomizer assembly to the Pulsetrak Speed Monitor/ Control System or Fotronics™** Atomizer Module.

Fluid Tubing Connection Requirements		
Pos.	**Fixed Atomizer**	**Pressure (nominal/max.)**
Paint Line (P.IN)	.156", .170", or .188" I.D. PFA, Teflon	7 bar
Solvent Line (SOL)	.125" I.D. PFA, Teflon	2-4 bar
Dump Line (DUMP)	.250" I.D. PFA, Teflon	Variable

Ill: Fluid Tubing Connection Requirements

CAUTION

The normal fluid flow range is 25-500 cc/min. The maximum flow rate must not exceed 500cc/min. to avoid solvent or paint from flooding into the internal portion of the air bearing motor assembly or front shroud.

5.7 Interlocks

The following system interlocks are required to prevent equipment damage:

1. Bearing air should remain on at all times and should be shut off only by turning off the main air to the pneumatic control cabinet.

CAUTION

- 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, before shutting off the main air supply.
- The bell assembly must be removed when making flow checks. If the paint is turned on when the bell is mounted on the motor shaft and not rotating, paint will enter the shaft and possibly damage the air bearing. Normally pneumatic interlocks will not allow the paint to trigger on when the turbine air is off.

WARNING

- 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 intermittent speed of 55,000 rpm. (See "Specifications".)

2. It should not be possible for the coating material to be sprayed unless the turbine is spinning.
3. Two interconnected 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 4 bars at the atomizer, the turbine air should be automatically interlocked to shut off.
4. High voltage must be interlocked with the solvent valve pilot signal to prevent solvent flow while high voltage is energized.
5. Turbine air and brake air must be interlocked to prevent both from being used simultaneously.

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.

As with any spray finishing system, operation of the ICE Bell 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. Adjustments to operating parameters, which cover spraying, cleaning and on/off control, include:

- Coating Materials
- Cool air control
- Fluid Valve Control
- Turbine Speed
- Bearing Air Adjustment
- Shaping Air
- Brake Air
- Electrostatic Voltage
- Target Distance

5.8 Coating Materials

The ICE Bell can be used with a full range of waterborne coating material conductivities. However, with coatings having very high fast drying process such as dispersion paints, the ICE Bell remain the unique choice.

5.9 Cool Air Control

The cool air is provided by the 4 air coolers located around the turbine.

Those patented devices use an additional air inlet port which creates, by vortec effect, a reduction of temperature in front of the atomizer.

Each individual air cooler is equipped with adjustment's screws to allow the possibility of temperature adjustment and to keep the bell cup at -15°C constantly.

The air inlet connection located at the back of the manifold is designed to dispatch the proper air volume to each of the vortec turbines.

5.10 Fluid Valve Control

The fluid valve in the ICE Bell is actuated by an air signal. The air pressure must exceed 5 bar to assure proper actuation of the valve. Applying air to the valve actuator turns on the fluid flow for that valve.

The 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 must be spinning at least 10,000 rpm when fluid is turned on to enable the fluid flow through the bell paint passage holes and be atomized.

The optional 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 optional solvent valve controls the flow of cleaning solvent to the bell. When actuated, solvent flows through the manifold and fluid tube into the rear of the bell cup. This provides cleaning of the inside of the bell cup. The solvent valve is not triggered at the same time as the paint trigger valve to prevent solvent from flowing backward into the paint line.

CAUTION

- The nominal fluid range is 25 - 500cc/min. During a color change or when flushing the system, higher flow rates may be required. However, the maximum flow rate must not exceed 500cc/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.

5.11 Turbine Speed

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

The 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 atomizer module, is recommended.

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 intermittent operating speed and turbine inlet pressure (55,000 rpm for the 57mm bell or 55,000 rpm for the 30mm bell).
Excessive speed may cause air turbine damage or damage the bell!

5.12 Bearing Air Adjustment

The nominal bearing air pressure is 6 bar, measured at the rear of the atomizer. Minimum pressure is 5 bar and maximum pressure is 7 bar. The turbine should never be operated with less than 5 bar 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.

CAUTION

- Bearing air must be on 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 ITW Ransburg warranty.

The ICE Bell is equipped with a bearing air return line to monitor bearing air pressure at the turbine manifold. When connected to the re- mote Atomizer speed controller, operation of the turbine will automatically be shut down whenever the bearing air pressure falls below 4 bar.

5.13 Shaping Air

Shaping air is used to shape the spray pattern. Lower input pressure results in wider pattern size, while higher input pressure reduces the pattern size. Shaping air does not help atomize the material, but will assist in the penetration of atomized particles into cavity areas. Ideally, shaping air should be kept at the minimum pres sure which will provide a proper finish for the fluid being sprayed. Excessive shaping air will cause some atomized particles to blow by the target, reducing the wrap around effect at edges and corners. Excessive shaping air may also cause some paint particles to bounce back onto the atomizer, causing the atomizer surface to become contaminated.

5.14 Brake Air

Brake air is used to slow the turbine speed in a minimum length of 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 Table IV. These times are based on 4 bar air pressure at the brake air connector.

The use of brake air is optional, and may not be required for many installations. The Atomizer Module control system provides the circuitry for automatic use of the brake air

Braking time	
To Brake from (rpm)	*Seconds (approx.)*
50,000 – 40,000	3.7
50,000 – 20,000	7.5
50,000 – 0	10.0
40,000 – 20,000	4.0
40,000 - 0	9.0

IV : Braking Time

5.15 Electrostatic Voltage

The ICE Bell Rotary Atomizer receives its operating voltage through a high voltage cable that is connected to a remote power supply. The power supply model and high voltage set- ting will depend upon various application requirements. See the "Specifications" section of this manual for approved power supplies and refer to that manual for detailed operating instructions.

NOTE

If paint defects occur, such as fatty edges or picture framing, reducing the voltage should be a last resort.

The electrostatic voltage applied to the ICE Bell will affect pattern size, transfer efficiency, wrap and penetration into cavity areas. Normally 80-100 kV setting is appropriate for most applications.

5.16 Target Distance

The distance between the ICE Bell 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 larger pattern size and drier finish. The high voltage circuitry 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 200 to 300 mm.

6 Maintenance

6.1 Cleaning Procedures

WARNING

- Electrical shock and fire hazards can exist during maintenance. High voltage 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 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.

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 ICE Bell turbine in solvent or other liquids. Turbine components will be damaged.
- Bearing air must be on during all cleaning procedures to protect the air bearing components.

6.2 Internal fluid path cleaning

Cleaning the incoming paint line (from paint supply source such as color manifold through the fluid valve block and bell assembly):

Turn off high voltage and turn on the trigger valve. With the bell spinning, flush cleaning solvent through the incoming paint line and through the manifold passages, through the fluid tube and onto the bell. 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.

6.3 Internal fluid path cleaning (without cleaning the incoming paint line)

Turn off the high voltage and trigger valve. With the bell spinning, turn on the solvent valve to allow cleaning solvent to flow through the manifold passages, through the fluid tube, and onto the bell. The spinning bell will atomize the solvent and clean out the bell passages.

With the solvent valve open, open the dump valve to clean the remaining manifold fluid pas- sage and to flush the dump line if desired

CAUTION

The maximum flow rate of 500cc/minute must not be exceeded during a flush routine.

WARNING

NEVER wrap the applicator, associated valves and tubing, and supporting hardware in plastic to keep it clean. A surface charge may build up on the plastic surface and discharge on the nearest grounded object. Efficiency of the applicator will also be reduced and damage or failure of the applicator components may occur.
WRAPPING THESE COMPONENTS IN PLASTIC WILL VOID WARRANTY!

WARNING

- To reduce the risk of fire or explosion, the regulations require that solvents used for exterior cleaning, including bell cleaning and soaking, be nonflammable (flash points higher than 37.8!C)
- Since electrostatic equipment is involved, those 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 ICE Bell!
- When using a rag to hand wipe the ICE Bell, the turbine air should be off but leave the shaping air and the bearing air turned on. Ensure the rotation has come to a complete stop. Be careful not to drip solvent into the opening behind the bell.

6.4 Bell cleaning

Normally, the internal cleaning instructions will suffice to clean the bell. If the internal cleaning instruction does not sufficiently remove all paint and residue from the bell, the bell may be removed for hand cleaning.

NOTE

It may be advantageous to develop a maintenance schedule for hand cleaning and inspection of the atomizer bell cup.

WARNING

Do not attempt to clean the bell edge while the bell is rotating. When attempting to stop or slow down the bell cup, **do not** hold a rag or gloved hand against the bell edge. This could damage the bell edge, which would adversely affect transfer efficiency and coating quality.

CAUTION

- Do not use abrasive materials which will scratch or damage the titanium bell.
- Before reinstalling the bell onto the shaft, check and clean the tapered mating surfaces of the turbine shaft and bell for any paint residue.
- Using an atomizer bell with paint buildup may cause a bell imbalance. An imbalanced bell may cause bearing damage and turbine failure, or may create mechanical stress on the plastic bell when operating at high speeds. Excessive paint residue caught between the internal tapered surface which seats in the motor shaft can prevent the bell from seating properly and result in an unbalanced turbine condition.

CAUTION

- Care must be taken when mounting the bell assembly onto the motor shaft. The bell should turn freely for several turns or until it fully bottoms on the motor shaft. If resistance is felt when the bell is first being turned onto the shaft, do not proceed further, the bell may be cross-threaded on the shaft. Remove the cup and carefully reinstall. If it is still difficult to turn, replace the bell.

WARNING

A bell assembly that is cross-threaded on the shaft can damage the bell, motor or shaping air housing and may come off the shaft while rotating.

6.5 Vibration Noise

If the ICE Bell is vibrating or making an unusually loud noise, it may mean that there is an unbalanced situation. The bell assembly may have dried paint on it, the bell may be physically damaged, or there may be paint trapped between the bell and the shaft preventing the bell from properly seating. If any of these conditions exist, they must be corrected prior to further operation. Do not continue to operate a noisy turbine. Warranty does not cover failure caused by imbalanced loading conditions.

WARNING

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

6.6 Turbine Repair And Rebuild

Turbine field repair or rebuild after factory warranty expires. Any attempt to disassemble turbine during warranty will void warranty (3 years or 15,000 hours).

Contact your distributor or Ransburg for turbine rebuilding instructions.

6.7 Air Filter / Element Replacement

Replacement Elements		
ITW Part#	Qty. Elements per Carton	Used on
RPM-32	4	RPM-417, Pre-Filter
RPM-33	8	RPM-418, Bearing Air Filter

V : Replacement Elements

6.8 Valves

No maintenance normally is normally required on the valve other than flushing solvent through the valve daily. If there is any question about the valve opening when air is present, slide back the rear shroud on the ICE Bell and inspect for valve action. Visually inspection for leaks should be made on a weekly basis. Should the valve fail to function properly or leaks appear, it can be easily replaced. Refer to the fluid valves service manual for detailed instructions on preventive maintenance and inspection.

6.9 General

Verify daily that the operating parameters have not varied from the set up standard. A drastic change in system current, high voltage, turbine air, shaping air pressure, or fluid pilot air pressure van be an early indicator of a component or system problem.

6.10 Preventive Maintenance

6.10.1 Daily Maintenance (During Each Preventive Maintenance Break)

- Open solvent valves and flush out fed tubes and bell cups for 3-5 seconds (trigger and dump valve closed).

WARNING

- 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 ort gloved hand against the bell cup edge. This can damage the resistance coating at the bell cup edge.

CAUTION

Daily removal and soaking of the bell cup may not be required it the bell cup is properly flushed as indicated above. 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.

- Wait for rotation to cease and then clean off bell cup edge and shaping air ring and any other non-protected (unwrapped) outer surfaces. Use a soft cloth dampened with solvent. The protective disposable wrapping be a material such as the type used on electrostatic guns.

WARNING

In the event the bell cup comes in contact with a part, that cup should be checked for damage and replaced if necessary before continuing to spray.

- Check bell cup voltage using high voltage probe. Voltage should be approximately 85kV when 100kV is set on the power supply.

WARNING

Do not place high voltage probe on bell edge unless rotation is fully stopped!

NOTE

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

- Check the amount of paint build up on the outer protective wrap. If excessive, replace wrap as required.

NOTE

The protective disposable wrap is for one time use only. Do not wash and reuse the wrap.

NOTE

Normally the wrap will not need replacement daily and could last about one week. See “Weekly Maintenance” in the “Maintenance” Section.

6.10.2 Weekly Maintenance (Prior to start or End of Production Week)

- Monitor rotational speed of all bells at the speed control (should be within approximately 5% of target output)
- Monitor high voltage output indicated on the display of the control unit or at the meter of the power supply (should be within approximately 5% of target output)
- 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 approximately 10% of target flow rate)

CAUTION

Maximum flow rate should not exceed 500cc/min!

- Remove protective wrap from outer housing and discard. Clean any paint on outer surface of front and rear housing with soft cloth dampened with solvent (See “Warning” under “Daily Maintenance” on avoiding the use of cleaning solvent containing d-limonene.)
- Check the high voltage connection by removing the cable assembly from the manifold. Examine the tip of the banana plug for any contaminants or corrosion. Clean or replace the plug as required.
- Ensure that the high voltage cable is properly seated, tighten the strain relief, and reinstall the connector cover. In an oscillation or reciprocator type application, always ensure adequate cable slack between the applicator and the power supply termination point.
- Remove the front shroud and check for any signs of solvent or paint leakage. Clean as required.
- Check position of high voltage tube where it enters the motor housing. Make sure the O-Ring is not exposed. If so, push the tube in place.
- Remove bell cup and soak in solvent (MEK any Xylene blend) for 1 to 2 hours. Remove from cleaning solution and blow dry before replacing.

WARNING

Do not use reclaim solvent containing d-Limonene to soak bell cups.

NOTE

It may be necessary to remove the bell cups for cleaning more frequently than weekly (See “Caution” under “Daily Maintenance”).

- 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.

WARNING

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

- Release the rear cover fasteners and slide the shroud back to expose the fluid manifold and regulator. 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.
- Reinstall rear shroud, bell cup, and front shroud. Rewrap the outer housing and insulator mounting rod (refer to "Disassembly Procedures" for definite instructions).

NOTE

The outer protective wrap may have to be replaced more frequently than weekly. Daily inspection of the amount of paint buildup on the wrap will determine the frequency of replacement.

6.11 Low Voltage Test

When replacing the resistive components, troubleshooting, reassembling or as periodic inspection procedure, a "low voltage" test can be performed on the rotator assembly to ensure that there are good electrical contacts and that the resistors are not defective. A high voltage resistor tester (Megger) must be used which has an output voltage of 500 to 1000 VDC.

- With the high voltage turned OFF, disconnect the high voltage cable from the rear of the rotator assembly.
- Insert a test cable or the test meter probe into the rear of the rotator and connect to the voltage output of the test meter.
- Remove the front shroud and bell cup and clip the test meter ground to the rotator shaft.
- Set the test meter voltage output to a minimum of 500 V (DC) and maximum of 1000 VDC.
- The meter should indicate between approximately 725 Mega-Ω and 770 Mega-Ω. If the test instrument is reading higher than 770 Mega-Ω, then the electrical contacts between the resistor tube, resistor block and motor assembly need to be checked.
- Remove the motor assembly and resistor tube and verify that the resistor tube springs are at least 3/8" and are not distorted. Also make sure that there is no visible contamination in the motor cavity where the resistor tube inserts.

Refer also to the "Troubleshooting Guide"

6.12 Disassembly Procedures

- Make sure the following conditions exists prior to disassembly:
- Pay particular attention to the procedures and Warning information, outlined under "Cleaning Procedures", prior to performing any maintenance.
- The air to all supply and pilot lines is off.
- The high voltage power supply has been shut off.
- The atomizer's valves, feed tube, bell cup and fluid supply lines have been cleaned with solvent and purged dry with air.
- The bell cup has stopped rotating.
- All external surfaces must be clean and free of paint or paint residue.

NOTE

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

6.13 Front Shroud Removal

Remove the front shroud (Parts Identification, Page 8, Item 2) from the atomizer, using the RPM-419, or other properly fitting spanner wrench, and turning CCW (viewed as facing the front end).

Note that when the front shroud is removed, the shaping air cap (Parts Identification, Page 8, Item 13) is removed with it. The ICE Bell turbine and the bell assembly will now be exposed.

Using the same wrench, it is also possible to separate the shaping air cap from the front shroud. This is much easier to do if the front shroud is mounted on the turbine assembly, since it is difficult to grasp the shroud and the wrench simultaneously if the parts are removed from the mechanical support of the assembly. Hold the front shroud stationary while turning the shaping air ring CCW. Note that it's only necessary to separate these parts if replacing one of them, or for thorough cleaning.

When installing the front shroud onto the turbine assembly, be sure that it is fully tightened. The shroud will appear tight after a few turns, but will still be loose. The shroud can than be tightened down fully until it bottoms against the air manifold assembly.

6.14 Atomizer Bell Cup Removal

To remove the atomizer bell cup, place the wrench, part number RPM-419, over tha flats on the motor shaft to lock in place. Unscrew the bell by turning CCW with the other hand (while facing to front of the atomizer). If the bell cannot be removed by hand, use a second RPM-419 wrench, placed over the wrench flats of the bell cup.

Refer to "Preventive Maintenance" in the "Maintenance" section for important information about bell and shaft cleanliness. Do not install a paint contaminated or damaged bell on the turbine shaft. When installing the bell on the shaft, the bell should be **firmly** secured by hand or use wrench RPM-419, and torque to 50 lb-in -0/+40 lb-in.

6.15 Turbine Removal

The turbine assembly is removed from the ICE Bell atomizer after removing the front shroud assembly. Four mounting bolts will then be exposed, which hold the turbine assembly to the air manifold assembly. These are the larger socked head screws, located toward the outer edge of the motor housing.

Holding the turbine assembly carefully so that it does not drop and using a 5/32 inch Allen wrench, remove the four mounting screws which hold the turbine to the air manifold.

The turbine assembly can now be replaced or serviced as necessary.

7 Troubleshooting Guide

General Problem	Possible Cause	Solution
Bad spray pattern	1. Bell cup damaged	1. Replace bell cup.
	2. Low voltage	2. See "low or no voltage" below.
	3. Paint lodged in shaping air	3. Disassemble and clean
Low or no High Voltage	1. High current draw	1. Improve paint line isolation
	2. Solvent valve is actuated	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).
	3. Loss of high voltage connection at the power supply	3. Ensure proper high voltage connection at the power supply. Refer to "Low Voltage Test" in the "Weekly Maintenance" section of this manual.
	4. Loss of high voltage connection	4. Verify high voltage connection into the manifold. Refer to "Low Voltage Test" in the "Weekly Maintenance" section of this manual.
	5. Loss of high voltage connection at the turbine assembly	5. Verify high voltage tube connection into the turbine housing. See "Low Voltage Test" in the "Weekly Maintenance" section of this manual.
	6. Power supply failure	6. Refer to the power supply manual for detailed troubleshooting guide.
	7. Improper limiting current and voltage settings	7. To readjust settings, refer to the power supply manual.
	8. Atomizer grounding out (usually indicated by high current draw)	8. a.) Clean atomizer externally with non-polar solvent. b.) Check the atomizer for internal fluid leaks. c.) Check for internal arcing (usually indicated by internal sparking sounds).
	9. Damaged high voltage cable between atomizer and power supply	9. Repair or replace high voltage cable.
	10. Improper color change (i.e., paint or solvent in dump line)	10. Optimize color change.

General Problem	Possible Cause	Solution
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 100kV 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 megΩ).
	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 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 Bell cup damaged	The recommended target distance is between 200 & 300 mm (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. b. Increase bearing air supply pressure to 6 bar
	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).
Speed Feedback Fault	1. Damaged fiber-optic cable between atomizer and control panel	1. Repair or replace fiber-optic cable.
	2. Connection at the fiber-optic transmitter is loose	2. Re-install fiber-optic cable and tighten the compression nut.
	3. Fiber optic transmitter failure	3. Replace fiber optic transmitter
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 regulator does not actuate	2. a. Verify fluid supply. b. Verify that air pilot signal is present
	3. Fluid valve does not actuate	3. a. Verify that air pilot signal is present. b. Fluid valve air pilot pressure is too low. Increase air pressure to 70 psig minimum. c. Replace fluid valve.
	4. Clogged fluid tube	4. Remove and inspect fluid tube

General Problem	Possible Cause	Solution
Continuous Fluid Flow	1. Fluid valve open 2. Fluid valve seat damaged or worn	1. a. Remove air pilot signal. b. If still open, replace fluid valve. 2. Replace fluid valve seat.
Uncontrollable Fluid Flow	1. Insufficient back pressure to fluid regulator 2. Fluid regulator does not control flow	1. Replace fluid tube with the next smaller inner diameter size. 2. Disassemble fluid regulator and inspect for failed components
Fluid leakage Around Fluid Valve	1. Damaged o-ring(s) on outer diameter of valve body 2. Damaged or worn needle seals inside valve assembly	1. Replace o-ring(s). 2. Replace valve assembly.

8 Parts Identification

8.1 Explosion View

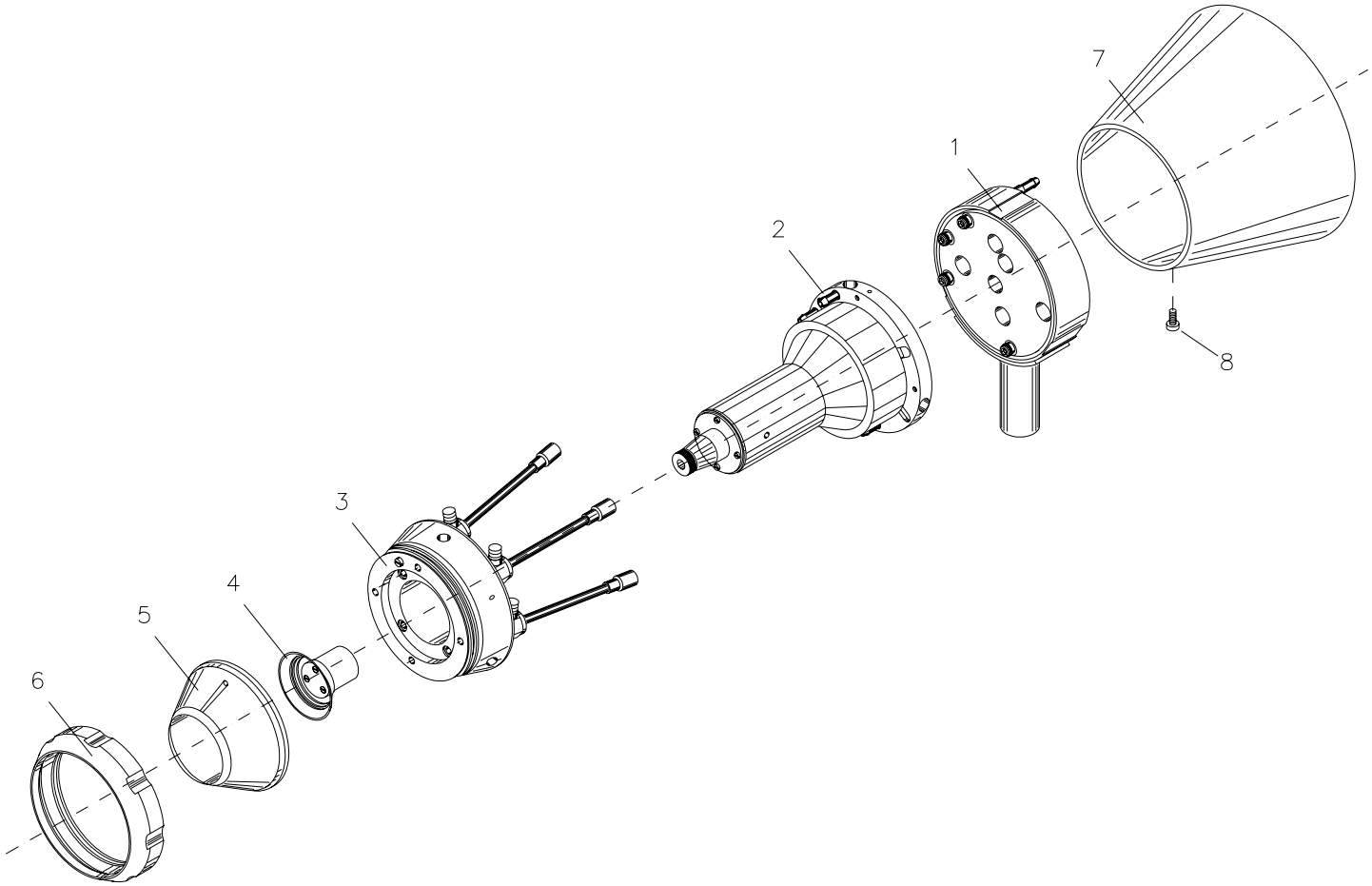


Figure 2: Parts Identification

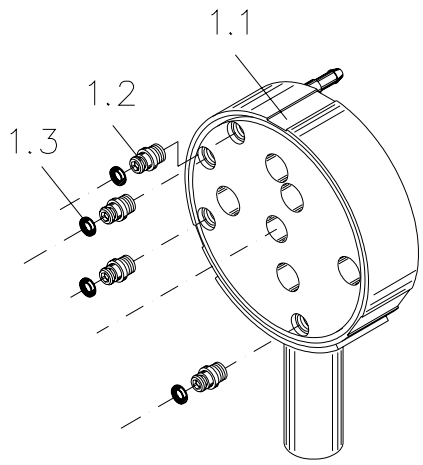
8.2 PARTS LIST ICE BELL

Pos.		Reference	Designation	Number
1			*Unit Manifold*	*1*
1.1		102048	Manifold	1
1.2		102053	Nippel	4
1.3		AGMD-122	O-Ring	4
1.4*		ESTA-402-4	Straight Connector R3/8"A 12mm	1
1.5*		ESTA-402-2	Straight Connector R1/4"A 12mm	1
1.6*		ESTA-402-1	Straight Connector R1/4"A 8mm	1
1.7*		ESTA-406-4	L-Connection R1/4"A 8mm	1
1.8*		ESTA-421-2	Twin Push Nippel 8 mm	1
1.9*		ESTA-437-2	Angle Connector 8 mm	1
2			*Unit Turbine*	*1*
2.1		RPM-401-1	Turbine	1
2.2		RPM-100	Front Cover	1
2.3		SSF-3137	Screw	8
2.4		RPM-439	Paint Tube	1
2.5		79001-05	O-Ring	1
2.6		102047	Adapter Ring	1
2.7		SS-7936-Ni	Screw	3
2.8		SSF-3117	Screw	3
2.9*		KK-4460	Latch Button Repair Kit	1
2.10*		9704-11	Shaping Air hose	117mm
3			*Unit Front End*	*1*
3.1		102049	Front End	1
3.2		AGMD-122	O-Ring	4
3.3		AGMD-119	O-Ring	1
3.4		DIN84M4X10PA	Screw plastic	1
3.5		AGMD-123	O-Ring	1
3.6		102057	O-Ring	1
3.7		102055	Air Coolers	4
3.8*		SO31221-8-1/8	Hose Connection	4
3.9*		ESTA-434-1	Air Cooler hose	2 MT
4			*Unit Bell*	*1*
4.1		RPM-104-1	Bell Titan	1
4.2		102065	Splash Plate	1
4.3		78594-16F	Screw	3
5			*Unit Shaping Air Screw/Ring*	
5.1		102050-03	Shaping Air Screw	1
5.2		102051-03	Shaping Air Ring	1
5.3		DIN84M4X10PA	Screw plastic	4
6		102052	Shaping Nut	1
7		102054	Shroud	1
8		DIN84M5X10PA	Screw plastic	3
9*		ESTA-422	T-Connector 4mm	1
10*		IQSDRV4	One-Way Restrictor	1
11*		ESTA-462	hose 1X2mm	0,5MT
12*		ESTA-433-1	Hose 2X4mm	0,5MT
13*		ESTA-433-2	Hose 2,7X4mm	1MT
14*		RPM-419	Wrench Assembly	1
parts with “*” are not mapped on the drawing				

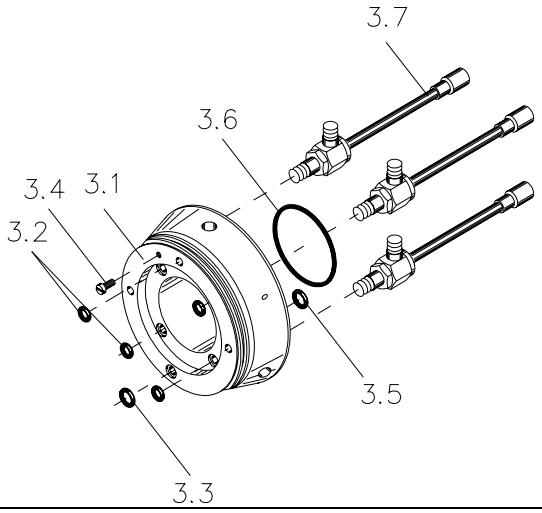
VI: Parts List ICE Bell

8.3 Drawing Units

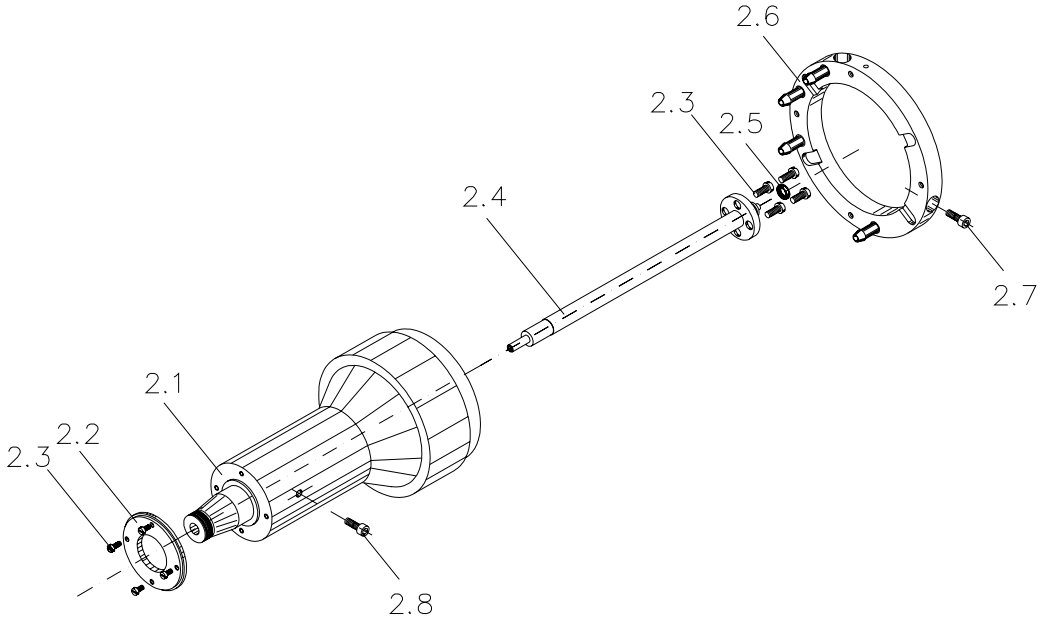
1 UNIT Manifold



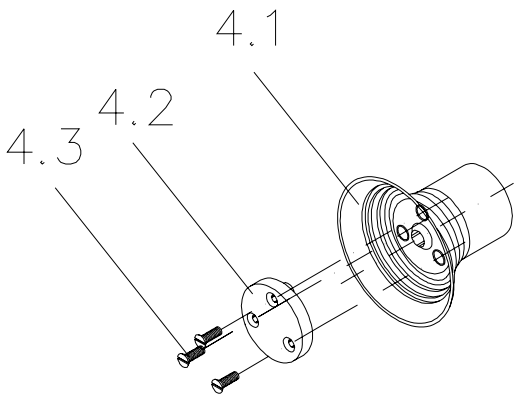
3 UNIT Front End



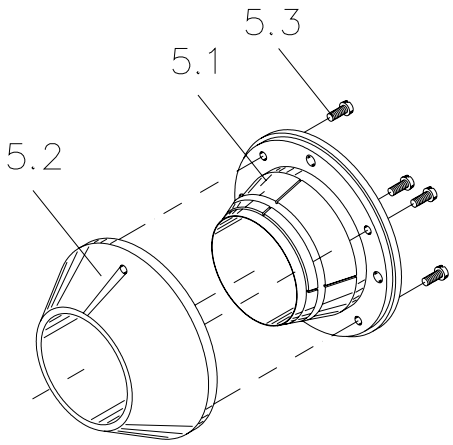
2 UNIT Turbine



4 UNIT Bell



5 UNIT Shaping Air Screw/Ring



9 Warranty Policies

9.1 Limited Warranty

ITW 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 ITW 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 ITW 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 IN PLASTIC, SHRINK-WRAP, ETC. WILL VOID THIS WARRANTY.

FLUID HANDLING: One (1) year from date of purchase (i.e. Totalizer, CCV Valves, etc.).

AIR BEARING ROTATORS: Fifteen thousand (15,000) hours or three (3) years, whichever occurs first. Warranty period begins on the date of purchase.

ITW RANSBURG'S ONLY OBLIGATION UNDER THIS WARRANTY IS TO REPLACE PARTS THAT HAVE FAILED BECAUSE OF FAULTY WORKMANSHIP OR MATERIALS. THERE ARE NEITHER IMPLIED WARRANTIES NOR WARRANTIES OF EITHER MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ITW 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 ITW Ransburg's opinion the warranty item in question, or other items damaged by this part was improperly installed, operated or maintained, ITW 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

10 Appendix

10.1 ITW Ransburg Paint And Solvent Specifications

	REA® / EFM™	REM™ / M90	NO. 2 HAND GUN	TURBODISK™	AEROBELL™ II*** AEROBELL™ AEROBELL™ 33 RMA™-101
RECOMMENDED VISCOSITY USING A ZAHN NO. 2	18 TO 30 SEC	18 TO 30 SEC	20 TO 60 SEC	20 TO 60 SEC	20 TO 60 SEC
PAINT ELECTRICAL RESISTANCE**	.1 MΩ TO ∞	.1 MΩ TO ∞	.1 TO 1 MΩ	.1 MΩ TO ∞	.1 MΩ TO ∞
RECOMMENDED DELIVERY (UP TO)	1000 cc/min	1500 cc/min	180 cc/min	1000 cc/min	500 cc/min

GUIDE TO USABLE SOLVENT SELECTION

CHEMICAL NAME	COMMON NAME	CATEGORY	*CAS NUMBER	EVAP. RATE†	ELECTRICAL RESISTANCE**
DICHLOROMETHANE	Methylene Chloride	Chlorinated Solvents	75-09-2	**14.5**	HIGH
MYTHYL ACETATE		Esters	79-20-9	**11.8**	LOW
VM & P NAPHTHA	Naptha	Aliphatic Hydrocarbons	803-232-4	**10**	HIGH
ACETONE		Ketones	67-64-1	**5.6**	LOW
BENZENE		Aromatic Hydrocarbons	71-43-2	**5.1**	HIGH
ETHYL ACETATE		Esters	141-78-6	**3.9**	MEDIUM
2-BUTANONE	MEK	Ketones	78-93-3	**3.8**	MEDIUM
ISO-PROPYL ACETATE		Esters	108-21-4	**3.4**	LOW
ISOPROPYL ALCOHOL	IPA	Alcohols	67-63-0	**2.5**	LOW
2-PENTANONE	MPK	Ketones	107-87-9	**2.5**	MEDIUM
METHANOL	Methyl Alcohol	Alcohols	67-56-1	**2.1**	LOW
PROPYL ACETATE	n-Propyl Acetate	Esters	109-60-4	**2.1**	LOW
TOLUOL	Toluene	Aromatic Hydrocarbons	108-88-3	**1.9**	HIGH
METHYL ISOBUTYL KETONE	MIBK	Ketones	108-10-1	**1.6**	MEDIUM
ISOBUTYL ACETATE		Esters	110-19-0	**1.5**	LOW
ETHANOL	Ethyl Alcohol	Alcohols	64-17-5	**1.4**	LOW
BUTYL ACETATE		***Esters***	***123-86-4***	***1.0***	***LOW***
ETHYLBENZENE		Aromatic Hydrocarbons	100-41-4	**.89**	HIGH
1-PROPANOL	n-Propyl Alcohol	Alcohols	71-23-8	**.86**	LOW
2-BUTANOL	sec.-Butyl Alcohol	Alcohols	78-92-2	**.81**	LOW
XYLOL	Xylene	Aromatic Hydrocarbons	133-02-07	**.80**	HIGH
AMYL ACETATE		Esters	628-63-7	**.67**	MEDIUM
2-METHYLPROPANOL	iso-Butyl Alcohol	Alcohols	78-83-1	**.62**	LOW
METHYL AMYL ACETATE		Esters	108-84-9	**.50**	LOW
5-METHYL-2-HEXANONE	MIAK	Ketones	110-12-3	**.50**	MEDIUM
1-BUTANOL	n-Butyl Alcohol	Alcohols	71-36-3	**.43**	LOW
2-ETHOXYETHANOL		Glycol Ethers	110-80-5	**.38**	LOW
2-HEPTANONE	MAK	Ketones	110-43-0	**.40**	MEDIUM
CYCLOHEXANONE		Ketones	108-94-1	**.29**	MEDIUM
AROMATIC-100	SC#100	Aromatic Hydrocarbons		**.20**	HIGH
DIISOBUTYL KETONE	DIBK	Ketones	108-83-8	**.19**	MEDIUM
1-PENTANOL	Amyl Alcohol	Alcohols	71-41-0	**.15**	LOW
DIACETONE ALCOHOL		Ketones	123-42-2	**.12**	LOW
2-BUTOXYETHANOL	Butyl Cellosolve	Glycol Ethers	111-76-2	**.07**	LOW
CYCLOHEXANOL		Alcohols	108-93-0	**.05**	LOW
AROMATIC-150	SC#150	Aromatic Hydrocarbons		**.004**	HIGH
AROMATIC-200		Aromatic Hydrocarbons		**.003**	HIGH

FASTER ⇑ SLOWER ⇓

VII: Guide to Usable Solvent Selection

* CAS Number: Chemical Abstract Service Number

** Using the Ransburg Meter.

*** Solvent borne Configuration Only.

† Information Obtained From: http://solvdb.ncms.org

Evaporation Rate is Based Upon Butyl Acetate Having a Rate of 1.0

NOTE

This page provides resistivity determination and control information that we feel is necessary when using ITW Ransburg equipment.

10.2 ITW Ransburg Viscosity Conversion Chart

ITW RANSBURG VISCOSITY CONVERSION CHART

Poise	Centipoise	DuPont Parlin 7	DuPont Parlin 10	Fisher 1	Fisher 2	Ford Cup 3	Ford Cup 4	Gardner - Holdt Bubble	Gardner - Lithographic	Krebs Unit KU	Saybolt Universal SSU	Zahn 1	Zahn 2	Zahn 3	Zahn 4	Zahn 5	Sears Craftsman Cup	Din Cup 4
.1	10	27	11	20			5	A-4			60	30	16					10
.15	15	30	12	25			8	A-3			80	34	17					11
.2	20	32	13	30	15	12	10				100	37	18					12
.25	25	37	14	35	17	15	12	A-2			130	41	19					13
.3	30	43	15	39	18	19	14	A-1			160	44	20					14
.4	40	50	16	50	21	25	18	A			210	52	22				19	15
.5	50	57	17		24	29	22			30	260	60	24				20	16
.6	60	64	18		29	33	25	B		33	320	68	27				21	18
.7	70		20		33	36	28			35	370		30				23	21
.8	80		22		39	41	31	C		37	430		34				24	23
.9	90		23		44	45	32			38	480		37	10			26	25
1.0	100		25		50	50	34	D		40	530		41	12	10		27	27
1.2	120		30		62	58	41	E		43	580		49	14	11		31	31
1.4	140		32			66	45	F		46	690		58	16	13		34	34
1.6	160		37				50	G		48	790		66	18	14		38	38
1.8	180		41				54		000	50	900		74	20	16		40	43
2.0	200		45				58	H		52	1000		82	23	17	10	44	46
2.2	220						62	I		54	1100			25	18	11		51
2.4	240						65	J		56	1200			27	20	12		55
2.6	260						68			58	1280			30	21	13		58
2.8	280						70	K		59	1380			32	22	14		63
3.0	300						74	L		60	1475			34	24	15		68
3.2	320							M			1530			36	25	16		72
3.4	340							N			1630			39	26	17		76
3.6	360							O		62	1730			41	28	18		82
3.8	380										1850			43	29	19		86
4.0	400							P		64	1950			46	30	20		90
4.2	420										2050			48	32	21		95
4.4	440							Q			2160			50	33	22		100
4.6	460							R		66	2270			52	34	23		104
4.8	480								00	67	2380			54	36	24		109
5.0	500							S		68	2480			57	37	25		112
5.5	550							T		69	2660			63	40	27		124
6.0	600							U		71	2900			68	44	30		135
7.0	700									74	3375				51	35		160
8.0	800								0	77	3380				58	40		172
9.0	900							V		81	4300				64	45		195
10.0	1000							W		85	4600					49		218
11.0	1100									88	5200					55		
12.0	1200									92	5620					59		

VIII: Viscosity Conversion Chart

ITW RANSBURG VISCOSITY CONVERSION CHART (Continued)

Poise	Centipoise	DuPont Parlin 7	DuPont Parlin 10	Fisher 1	Fisher 2	Ford Cup 3	Ford Cup 4	Gardner - Holdt Bubble	Gardner - Lithographic	Krebs Unit KU	Saybolt Universal SSU	Zahn 1	Zahn 2	Zahn 3	Zahn 4	Zahn 5	Sears Craftsman Cup	Din Cup 4
13.0	1300							X		95	6100					64		
14.0	1400								1	96	6480							
15.0	1500									98	7000							
16.0	1600									100	7500							
17.0	1700									101	8000							
18.0	1800							Y			8500							
19.0	1900										9000							
20.0	2000									103	9400							
21.0	2100										9850							
22.0	2200										10300							
23.0	2300							Z	2	105	10750							
24.0	2400									109	11200							
25.0	2500							Z-1		114	11600							
30.0	3000									121	14500							
35.0	3500							Z-2	3	129	16500							
40.0	4000									133	18500							
45.0	4500							Z-3		136	21000							
50.0	5000										23500							
55.0	5500										26000							
60.0	6000							Z-4	4		2800							
65.0	6500										30000							
70.0	7000										32500							
75.0	7500										35000							
80.0	8000										37000							
85.0	8500										39500							
90.0	9000										41000							
95.0	9500										43000							
100.0	10000							Z-5	5		46500							
110.0	11000										51000							
120.0	12000										55005							
130.0	13000										60000							
140.0	14000										65000							
150.0	15000							Z-6			67500							
160.0	16000										74000							
170.0	17000										83500							
180.0	18000										83500							
190.0	19000										88000							
200.0	20000										93000							
300.0	30000										140000							

IX: Viscosity Conversion Chart (Cont.)

NOTE

All viscosity comparisons are as accurate as possible with existing information. Comparisons are made with a material having a specific gravity of 1.0.

VOLUMETRIC CONTENT OF HOSE OR TUBE (English Units)							
I.D. (inches)	cc/ft.	Cross Section (in.²)	Length				
			5ft. (60")	10ft. (120")	15ft. (180")	25ft. (300")	50ft. (600")
1/8	2.4	.012	.003 gal. .4 fl. oz.	.006 gal. .8 fl. oz.	.010 gal. 1.2 fl. oz.	.016 gal. 2.0 fl. oz.	.032 gal. 4.1 fl. oz.
3/16	5.4	.028	.007 gal. .9 fl. oz.	.014 gal. 1.8 fl. oz.	.022 gal. 2.8 fl. oz.	.036 gal. 4.6 fl. oz.	.072 gal. 9.2 fl. oz.
1/4	9.7	.049	.013 gal. 1.6 fl. oz.	.025 gal. 3.3 fl. oz.	.038 gal. 4.9 fl. oz.	.064 gal. 8.2 fl. oz.	.127 gal. 16.3 fl. oz.
5/16	15.1	.077	.020 gal. 2.5 fl. oz.	.040 gal. 5.1 fl. oz.	.060 gal. 7.6 fl. oz.	.100 gal. 12.7 fl. oz.	.199 gal. 25.5 fl. oz.
3/8	21.7	.110	.029 gal. 3.7 fl. oz.	.057 gal. 7.3 fl. oz.	.086 gal. 11.0 fl. oz.	.143 gal. 18.4 fl. oz.	.287 gal. 36.7 fl. oz.
1/2	38.6	.196	.051 gal. 6.5 fl. oz.	.102 gal. 13.1 fl. oz.	.153 gal. 19.6 fl. oz.	.255 gal. 32.6 fl. oz.	.510 gal. 65.3 fl. oz.

X : Volumetric Content of Hose or Tube (English Units)

VOLUMETRIC CONTENT OF HOSE OR TUBE (Metric Units)							
I.D. (mm)	cc/m	Cross Section (mm²)	Length				
			1.5m	3.0m	4.5m	6.0m	7.5m
3.6	10.2	10.2	15.3 cc	30.5 cc	45.8 cc	61.1 cc	76.3 cc
5.6	24.6	24.6	36.9 cc	73.9 cc	110.8 cc	147.8 cc	184.7 cc
6.8	36.3	36.3	54.5 cc	109.0 cc	163.4 cc	217.9 cc	272.4 cc
8.8	60.8	60.8	91.2 cc	182.5 cc	273.7 cc	364.9 cc	456.2 cc

XI: Volumetric Content of Hose or Tube (Metric Units)

EC – Manufacturer's Attestation

According to Annex II B of the EC Machine Rule 98/37/EC (MaschRL)

ITW Oberflächentechnik
Binks DeVilbiss Ransburg

We	ITW Oberflächentechnik GmbH & Co, KG Justus von Liebig Str. 31 D 63128 Dietzenbach
Hereby declare that the	Stationary Electrostatic Spraying Device
Type	ICE Bell, Model RPM-6093-PSE for waterborne paints

Is designed for the mounting into a machine, assembly with other machines into one machine and that initial operation is not permitted, unless it has been ascertained that the machine, into which this machine shall be mounted, complies with the requirement of EC Rule 98/37/EC.

Applied Harmonized Standard:

EN ISO 12100-1:2003	Safety of machines – basic concepts, general design principles – Part 1: Basic terminology, methodology
EN ISO 12100-2:2003	Safety of machines – basic concepts, general design principles – Part 2: Technical principles
EN 13463-1:2001	Non-electrical equipment for potentially explosive atmospheres
EN 1953:1998	Spraying equipment for liquid spraying material – safety requirements
EN 50176:1996	Stationary electrostatic spraying installations for flammable liquid spraying material

Dietzenbach, the day of

Signature

Name and Position

Ransburg

ITW Oberflächentechnik Gmbh & Co.KG
Justus-von-Liebig-Str. 31
D-63128 Dietzenbach
Tel +49(0)6074/403-1
Fax +49(0)6074/403-303
www.itweuropeanfinishing.com

ITW Industrial Finishing
Ringwood Road
Bournemouth, Dorset, BH11 9LH
Phone +44(0)1202-571111
Fax +44(0)1202-590073
www.itweuropeanfinishing.com

ITW Surfaces et Finitions
163-171 Avenue des Auréats B.P.1453
26014 Valence Cedex
Tel +33(0)4-7575-2700
Fax +33(0)4-7575-2779
www.itweuropeanfinishing.com