

# Operation and Maintenance Manual

## High Speed Rotary Atomizer **SUNBELL**

# ESA120



This manual contains important information on warnings and cautions. Read the manual thoroughly before starting to operate the equipment, and follow the instructions. Always keep the manual handy until such time as the equipment is no longer being used. If your manual is lost or worn badly, do not hesitate to contact our agency which is closest to you, or the Asahi Sunac Corporation, directly, and ask us to send you a new one.

# Introduction

Thank you for purchasing our product High Speed Rotary Atomizer, SUNBELL < ESA120>.

Please be sure to read this operation manual carefully before using this product so that you can always use it under the optimum conditions.

In particular, please fully understand the items in the specifications and use them according to the correct usage.

This product is used in combination with an electrostatic controller (BPS300).

Be sure to read the operation manual of the electrostatic controller carefully.

If you have any questions, please contact us by clearly stating the "product number" and "serial number" and contacting us on the back cover.



**Please keep this operation manual in a safe place where you can easily refer to it.**

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Please understand the contents of this instruction manual and be sure to follow the handling method. If you use it without following this instruction manual, **you may injure your body or damage your equipment and fire.**

The following safety precautions should be considered as minimum basic safety measures when using our products.

● **Precautions are displayed in the following two stages.**



**WARNING**

Hazards that can result in death or serious injury.



**CAUTION**

Danger that may result in minor or moderate injury or physical damage only.

● **Other important points are indicated as follows:**

**NOTE**

Observations to ensure the equipment's performance and functions are fully operational.

In addition, please observe all national and local laws and regulations related to fire, electricity, and safety, as well as the rules and regulations of your own company or business division.

« **Range of use suitable for the product** »

This product is an automatic spray gun designed to be installed in the coating booth equipped with an exhaust system and used for painting with paint adjusted for rotary atomization electrostatic paint.

If you use the product under conditions other than the above, it will be used improperly. Also, please be careful as it may cause an accident.

 **WARNING**

**Fire and explosion**



**Preventing fire and explosion in coating shop**

- **Do not use halogenated hydrocarbon solvents.**  
The aluminum alloy contained in this product's components may undergo a chemical reaction and explode.
- **Do not use this product outside its specifications.**  
Using it out of specification range may result in a fire hazard.
- **Provide adequate ventilation with ventilation equipment.**  
Volatilized organic solvents and other substances may remain and ignite, creating a risk of fire.
- **Clean the coating room and exhaust system (ducts and fans) regularly.**  
If the accumulated powder simply peels off, a spark may occur, which could cause a dust explosion.  
In the unlikely event of a fire, paint residue etc. will make it easier for the fire to spread and result in greater damage.



**Prevent fire and electric shock caused by faulty earthing**

- **All conductive objects in the coating booth (paint containers, peripheral equipment, etc.) must be grounded with an earth wire.**  
In an atmosphere ionized by high voltage, poorly grounded conductors can become charged, creating a risk of fire or electric shock due to spark discharge.  
The earth should be **Class D grounding or higher** (ground resistance 100 Ω or less).
- **Always keep the workpiece earthed.**  
Risk of fire or electric shock due to spark discharge from charged workpieces.
- **Paint hose must be grounded with an earth wire.**  
Static electricity can cause spark discharge, which can result in fire or electric shock.  
When paint flows through the injector and paint hose, static electricity is generated and becomes charged.
- **The paint container must be grounded with an earth wire (excluding the insulated stand specifications).**  
The paint path can cause the paint container to become charged, a risk of fire or electric shock.
- **The electrostatic controller must be grounded with an earth wire.**  
Static electricity can cause spark discharge, which can result in fire or electric shock.  
Connect the earth wire with screws or other fasteners to prevent it from coming loose.

《Warning and precautions for safe use》

 **WARNING**

**Fire and explosion**



**Prevent fire and electric shock caused by faulty earthing**

- **Be sure to periodically remove any paint that has stuck to the hanger.**  
If paint adheres to the contact part between the hanger and the object, there is a risk of fire or electric shock due to poor earthing.  
The ground resistance value should be 1kΩ or less for metal (1MΩ or less for resin) (measurement voltage should be 500V or more).
- **Do not place any items in the coating booth that are not necessary for coating.**  
Static electricity can cause spark discharge, which can result in fire or electric shock.
- **Paint operator must take precautions to prevent static electricity.**  
Static electricity builds up on the human body, causing sparks to discharge, which may result in fire or electric shock.



**Prevent fires caused by ignition of paints and solvents**

- **When nozzle cleaning, turn off the power to the electrostatic controller.**  
If high voltage is applied during nozzle cleaning, there is a risk of fire.
- **Do not bring any spark-producing devices, matches, lighters, etc.**  
Risk of explosion or fire due to ignition of flammable materials.

**Equipment misuse**



**Preventing accidents caused by poor maintenance**

- **Any abnormal noise, vibration or high voltage leakage, immediately stop operation.**  
Product damage may result in a fire hazard.
- **Do not operate if any parts are damaged or missing.**  
Product damage may result in a fire hazard.

 **WARNING**

**Human protection**



**Protection from high voltage**

- **Please wear anti-static shoes.**  
Static electricity builds up on the human body, causing sparks to discharge which may result in fire or electric shock.
- **Do not approach and touch the gun body while high voltage is applied.**  
Touch with high voltage parts may result in electric shock.
- **The coating work floor must have an anti-static construction with a leakage resistance of 1 MΩ or less.**  
There is a risk of electric shock to the operator.  
The scope of the antistatic structure is the entire work floor in a closed paint room.  
In an open paint booth, it is the area surrounded by 1.5m on either side of the booth opening and 2.5m in front of it.  
To maintain the antistatic effect, clean the work floor when it becomes dirty.
- **Do not use this product if you have a pacemaker.**  
The high voltage of this product may cause pacemakers to malfunction or stop functioning.



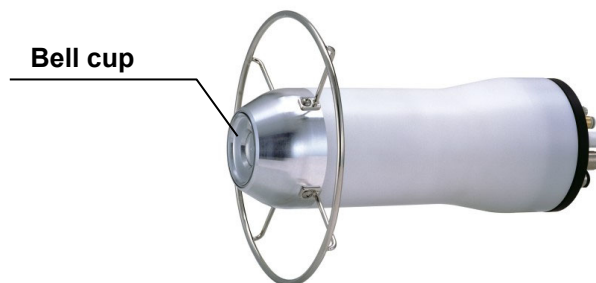
**Protection from solvents, air and paint pressure**

- **Do not spray paint towards person**  
Harmful substances may cause serious injury, including inflammation and poisoning.  
Pressurized paint can cause personal injury.
- **Wear protective glasses, a protective mask, and protective gloves\*<sup>1</sup> when handling paint.**  
Harmful substances may cause serious injury, such as inflammation or poisoning.  
Carefully read the safety data sheet (SDS\*<sup>2</sup>) of the paint you are using and take appropriate exposure prevention and protective measures.  
\*<sup>1</sup> When using protective gloves for skin absorption protection or to prevent dirt, it is necessary to prevent static electricity from building up on the human body.  
Be sure to ground it properly. (Recommended protective gloves are those specified in JIS T8118, or earth bands, etc.)  
\*<sup>2</sup> SDS : Safety Data Sheet
- **Clean the coating room and exhaust device (ducts and fans) regularly.**  
If the exhaust device does not function properly, harmful substances may cause serious injury, including inflammation and poisoning.

## 《Warning and precautions for safe use》

### **WARNING**

- **Do not use this product outside its specifications.**  
Using it out of specification range may result damage to the product.
- **Do not immerse the coating machine, connection/extension cable or hoses in cleaning solvent.**  
Electrostatic sprayer are electrical machines, immersing them in cleaning solvents may cause break down.
- **Connection/extension cable and hose should be hung from the ceiling or side walls and not dragged across the floor.**  
It may cause damage such as scratches.  
When using conductive paint, be sure to suspend the paint hose from an insulating material such as a rubber tube.
- **Never use a metal brush to clean the sprayer or its components.**  
It may cause scratches, breakdowns, and poor coating results.  
The bell cup and bell cap are important parts of the sprayer.  
If you use a metal brush to scratch it, uniform coating will not be possible.
- **Check frequently for paint leaks, air leaks, and loose screw.**
- **Do not touch the bell cup of the sprayer carelessly.**  
There is a risk of injury if you come into contact with the edge of the bell cup, which is rotating at high speed. Please handle with care.

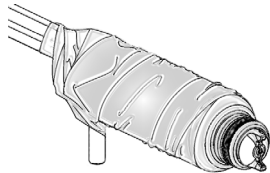


《Warning and precautions for safe use》

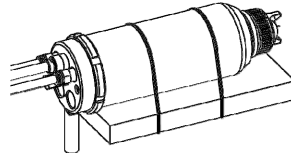
 **WARNING**

• **Do not install it like following.**

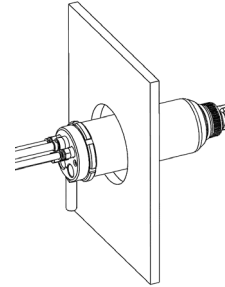
Electrostatic guns apply high voltage to the tip of the gun and the rear is earthed, make sure there are no obstacles on the main body (insulated part).



① If the gun is used with the dirt-proof sheet wrapped around it, moisture will accumulate inside, causing an overcurrent error.



② If a metal plate is attached close to the gun body, insulation breakdown may occur between the charged part of the gun and the plate.



③ If the gun body is inserted through a hole in a metal plate, insulation breakdown may occur, just as in ②.

● **A fire extinguisher should always be kept near the work area.**

In case of a fire, make sure to have equipment that has been regularly inspected installed at all times.

● **When disposing of this product, please dispose of it in accordance with the laws of your country.**

### ① Advantages



- (1) Compact body structure allows installation to every automatic machine including robots.
- (2) The bell cup for metallic painting allows high-quality metallic paint finishing effectively.
- (3) Integration of coil tube in the gun prevents electrostatic leakage due to sedimentation of metallic paints. In addition, the fluid passage provides good cleaning efficiency, which can reduce cleaning time and waste cleaning solvent.
- (4) The built-in shroud reduces dirt on the gun during painting, which can reduce “dirt in finish” and prevent abnormal stop due to electrostatic leakage.
- (5) The gun body can be separated at the middle, which, together with its simple internal structure, facilitates maintenance.
- (6) The “turbine speed controller” and the “electrostatic controller” keep constant atomization and electrostatic charge for the load fluctuation during painting, which provides stable finish quality.

### ② Components

#### (1) Gun body

- It is made up of the air spindle, cascade (electrostatic generator), and coil tube, and is covered by the body cover (shroud).
- The fluid passages are insulated by a coil tube and grounded by a bracket, which requires no insulating specification for the fluid supply passages.
- The fluid valve is not installed to the gun, which should be prepared separately.

#### (2) Bracket

- The bracket holds the tube cables in place for wiring connections. By removing the bracket access is possible to the interior parts of the gun for disassembling or assembling with ease.

### ③ Optional parts

#### (1) Air cap set

- Select the optimum specifications from the table below for the air cap and bell cup according to the painting conditions.

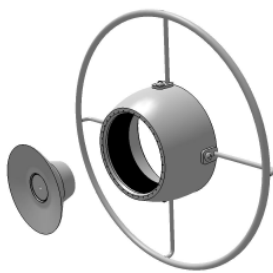
Application	Air cap set			Bell Cup to be combined	
	SA specifications	Pattern specifications	Part No.	Specification	Part No.
Metallic base Standard type (for coating on exterior plate)	Hole type	Large	157C-1	φ70	157C-101
		Middle	159A-1		
		Short	157E-1		
Metallic base Dust protection Type (for coating on interior plate)		Large	15CF	φ70	15CF-001
		Middle	15EA		
		Middle / Short	15EC		
	Short	15EE			
Solid, clear Coat	Slit type	-	157F	φ60	157F-001

※Bell cup is included in the air cap set.

- Table for selecting pattern width

No.	Set item No.	Pattern width (mm)				
		100	200	300	400	500
1	157C-1 15CF			■		
2	159A-1 15EA		■			
3	15EC		■			
4	157E-1 15EE	■				
5	157F			■	■	■

- Air cap set



Metallic base  
Standard type  
157C-1  
159A-1  
157E-1



Metallic base  
Dust protection type  
15CF  
15EA  
15EC  
15EE



Solid, clear type  
157F

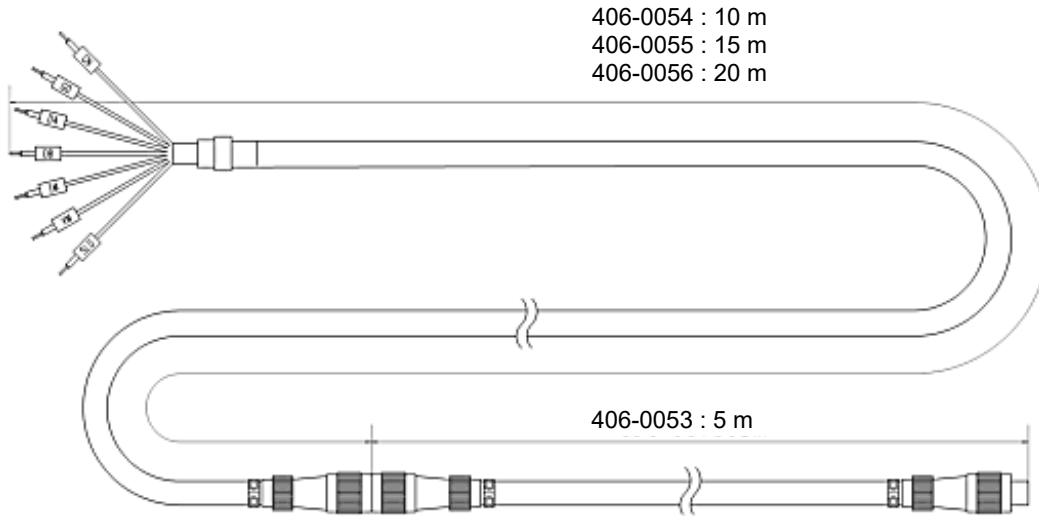
(2) Transmission cable

- It is used to make a connection between the gun and electrostatic controller, using a “connection cable” and “extension cable” in combination that can extend up to 25 m.

No.	Part No.	Part Name	Model	Specification
1	406-0053	Transmission cable	LVB5	5 m

No.	Part No.	Part Name	Model	Specification
1	406-0054	Extension cable	LVA2-10	10 m
2	406-0055	Extension cable	LVA2-15	15 m
3	406-0056	Extension cable	LVA2-20	20 m

● Connection of transmission cable

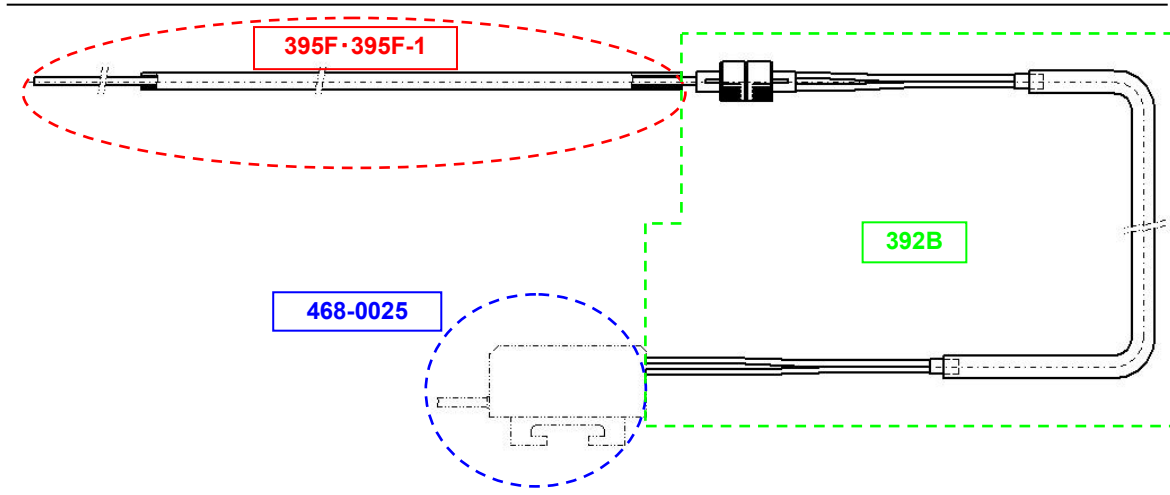


(3) Fiber optic cable

- It detects the air spindle RPM and transmits the detected information to the turbine speed controller, which adjusts the air spindle RPM in response to the signal so that the RPM setting will be maintained during the painting process.
- Please remember that the optical fiber cable cannot be cut or relayed midway.

No.	Part No.	Part Name	Model	Specification
1	395F	Fiber optic cable A	-	2 m (To the gun)
	395F-1			5 m (To the gun)
2	392B	Fiber optic cable B	-	20 m (To the amplifier)
3	468-0025	Fiber optic amplifier	F80R	Non-explosion-proof specifications
4	470-0007	Fiber cutter	FA500	-

● Connection of fiber optic cable



※1) A fiber cutter is attached to each of the optical fiber cable and tool kit 35AA.

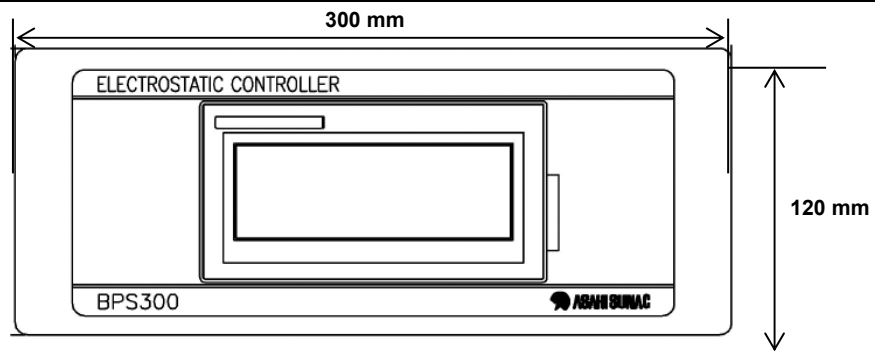
※2) 395F·395F-1, 392B, and 468-0025 are not sold as a set. Choose the parts as necessary from the above table.

(4) Electrostatic controller for painting equipment (Model: BPS300)

● It controls the electrostatic voltage of the gun-integrated cascade (electrostatic generator).

No.	Part No.	Part Name	Model
1	E-010390	Electrostatic controller for painting equipment	BPS300

● Outside view of BPS300



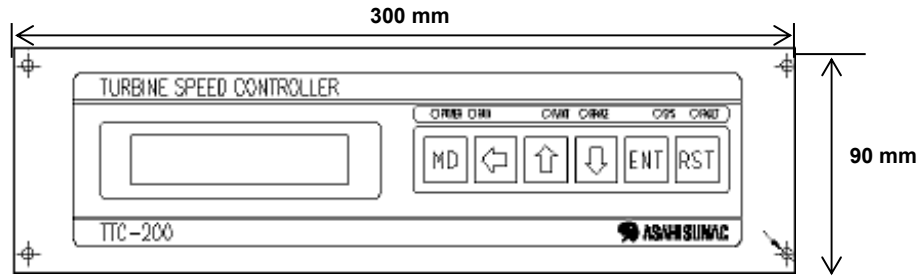
- The touch panel placed at the front of the controller and the installation of a microcomputer allow multi-functional control.

(5) Turbine speed controller (Model: TTC200)

- Sends the RPM of the bell cup via fiber optic cable and amplifier and controls the electropneumatic regulator (4 to 20mA) so that the RPM will be kept as specified using the control panel.

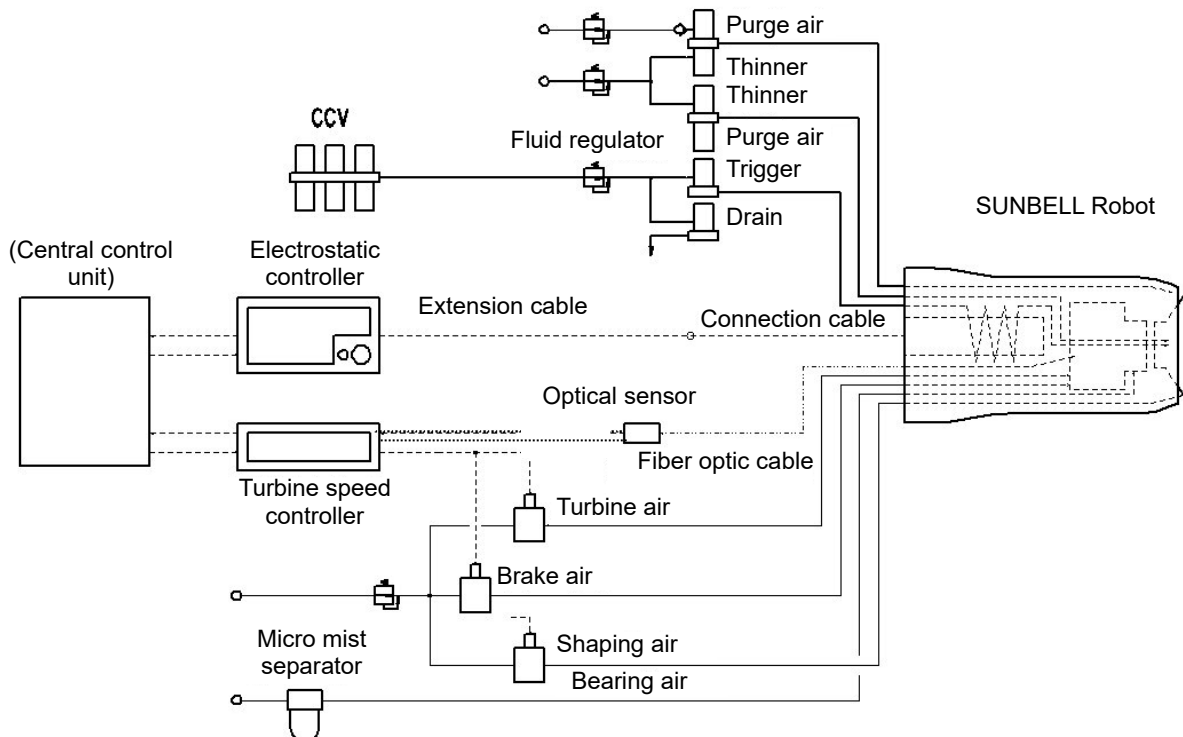
No.	Part No.	Part Name	Model
1	445-0134	Turbine speed controller	TTC200

- Outside view of TTC200



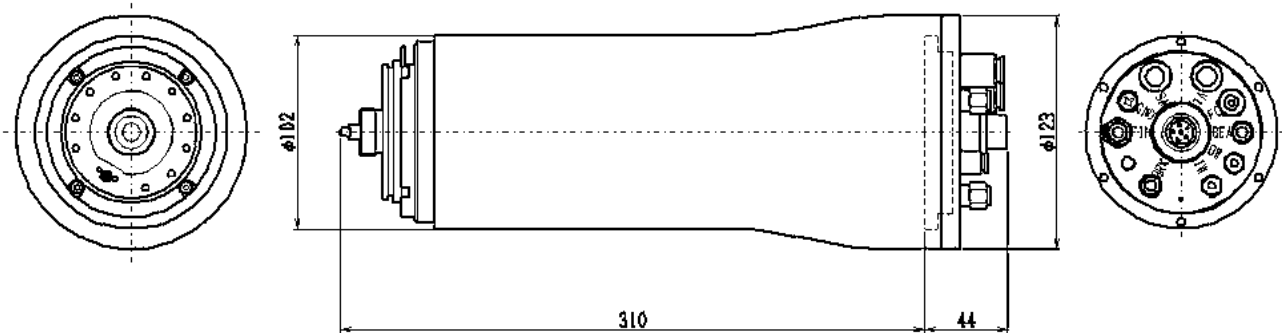
④ Overview of component connection

- Separately prepare and connect signal input/output cables to the electrostatic and turbine speed controllers as well as air pipes and fluid hoses as shown in the following diagram.
- See the specification sheet for each of the system components for proper connections of electric cables, air pipes and fluid hoses.



# 3

## Specification



Model	<b>ESA120</b>
Part No.	13AE
Electrostatic charge	-80 kV 150 $\mu$ A ※2)
Built-in tube	ID $\phi$ 3 × 900 mm
Applicable fluid resistance ※1)	1 M $\Omega$ -cm or more
Normal turbine speed	30,000 rpm or less ( $\phi$ 70 cup) 40,000 rpm or less ( $\phi$ 60 cup)
Bearing air pressure	0.5 MPa or more
Discharge rate	400 mL/min (ANR) (at viscosity 20 sec #FC4) or less ※3)
Cleaning thinner discharge rate	Cup interior cleaning 1,000 mL/min x 3 sec. or less Cup exterior cleaning 300 mL/min x 0.5 sec. or less
Air consumption	Bearing 100 L/min (ANR) (at 0.5 MPa) Turbine 500 L/min (ANR) (250 L/min (ANR) at 40,000 rpm under no load) Pattern 750 L/min (ANR) or less
Dimensions	$\phi$ 102 × 310 mm
Weight	3200 g
Conditions of use	Temperature 5 to 40°C Humidity 40 to 80% Air velocity through booth 0.3 to 0.4 m/sec

※1) Based on the measurements taken with paint ohmmeter made by ASAHI SUNAC CORPORATION

※2) The current indicated on monitor shall be kept at 100  $\mu$ A or less.

※3) This value is shown for reference purpose only. If your conditions differ from those given for reference, conduct painting test to obtain the finish quality you are looking for.

# 4

## Installation and Connections

### ① Installation of gun body

- (1) Fasten the gun securely to the reciprocator, robot arm or stationary stand.
- (2) Always ground the bracket by connecting its grounding wire to the automatic painting machine. (Grounding resistance should be 1 kΩ or less.)
- (3) Keep the metallic part of the gun tip at least 600 mm away from the nearest grounded object in the paint booth, such as water tank or conveyor rail.
- (4) Set the gun at an angle ranging from flat to straight down in terms of the direction in which the gun points.

### CAUTION

**If the gun is set pointing upward, the fluid may flow out of the bell cup into the air spindle, possibly resulting in damage to the air spindle.**

- (5) Set the gun traveling speed at 60 m/min (1000 mm/s) or less.

### CAUTION

**If the gun travels too fast, it will affect the transfer efficiency and cause a failure of the gun or automatic machine.**

- (6) Keep the acceleration of automatic machine at 1 G or less at reverse.

### CAUTION

**Constant shock exceeding 0.3 G will cause gun failure.**

### ② Air passage connections

- (1) Bearing air

The machine uses a precision air spindle that keeps the turbine shaft airborne with air pressure. So extreme care is necessary and you must follow the precautions described below.

### CAUTION

- For bearing air used for the air spindle, such air from which oils, water, and dust are fully removed should be used, as well as an air dryer should be installed.
- Install a micro mist separator as close to the gun as possible (within 10 m). Make sure that each air spindle has one dedicated micro mist separator.
- When installing air path downstream the micro mist separator, care should be exercised so that seal tape or liquid seal may not get into the line. Before installing the gun, fully exhaust air to remove all dust in the tube.
- Always keep the bearing air ON even after the completion of operation. It prevents seizure in case the turbine air supply turns on. It also prevents the splashed fluid or thinner from getting inside.

- (2) Other air paths

The air supply to the gun should be arranged in accordance with the following table to ensure enough air quantity and pressure.

Marking	Item	Function	Requirement	Joint dia.
TA	(1) Turbine air	Rotates the bearing.	500 L/min (ANR) (0.4MPa)	φ10-8
SA	(2) Shaping air	Atomization pattern adjustment	750 L/min (ANR) (0.4MPa)	φ10-8
BEA	(3) Bearing air	Supports the high-speed rotary bearing.	100 L/min (ANR) (0.5 MPa or more)	φ6-4
BRK	(4) Brake air	Brakes reverse rotation.	100 L/min (ANR) (0.5MPa)	φ6-4

(3) Other connections

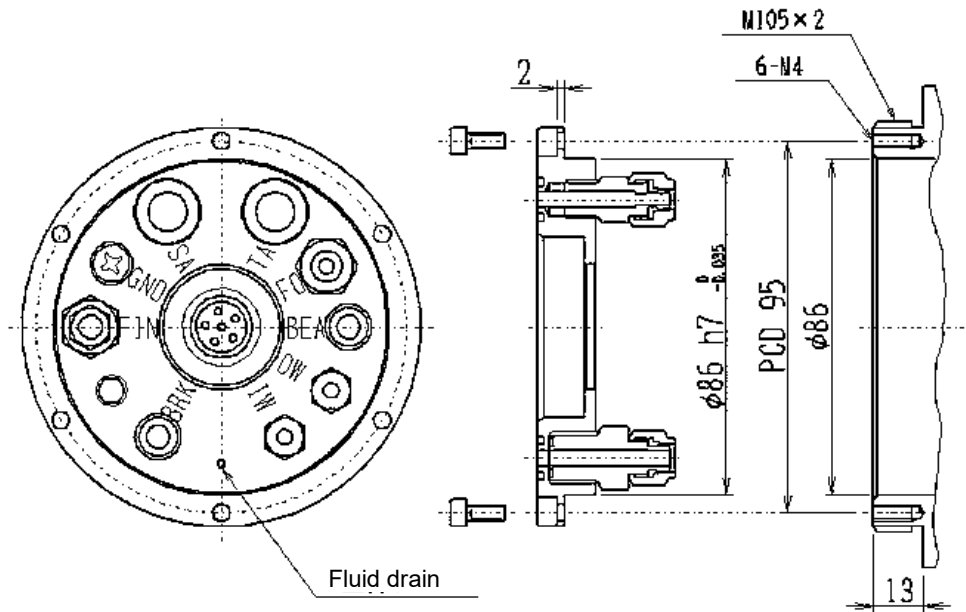
Refer to the table below for other connections.

Marking	Item	Function	Requirement	Joint dia.
FIN	(5) Paint inlet	Fluid supply	0.7 MPa or less	φ6-4
OW	(6) Cup exterior cleaning thinner	Cup interior cleaning	500 to 1000 mL/min × 3 s or less 0.7 MPa or less	φ4-2.5
IW	(7) Cup interior cleaning thinner ※1)	Cup exterior cleaning	Up to 300 mL/min (ANR) × 0.5s or less 0.7 MPa or less	φ4-2.5
FO	(8) Fiber optic cable	Detect rotation	-	φ6-4
GND	(9) Grounding	Grounds the gun.	Class D grounding	3 sq or more
(Center)	(10) Connection cable	Transmits power to the cascade.	-	φ6

※1) Cup exterior cleaning is used only when **BAC70M** and **BAC60** are selected for the air cap.

**CAUTION**

**This machine performs feedback control of the cascade. So route the connection cable apart from power cables and other noise sources (servo, inverter) as far as possible (30 cm or more). Noise interference may cause the electrostatic controller to judge the state to be electrostatic abnormality and prevent painting.**



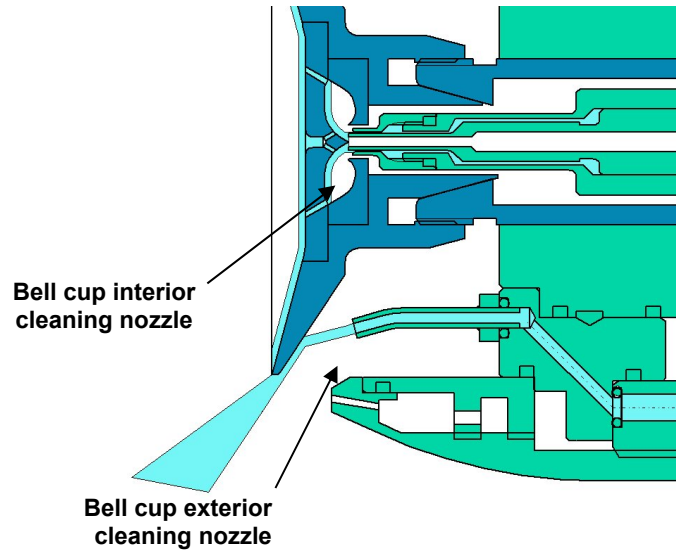
**③ Color change valve installation and setup**

To optimize the system functions, install and set up the color change valves and fluid lines in according with the instructions below.

- (1) Always provide an interlock so that the electrostatic controller will not be charged with static electricity when fluid lines are filled with thinner.
- (2) Always interlock the fluid valve ON/OFF solenoids so that the fluid valves will automatically turn OFF when the turbine speed drops to 10,000 rpm or less.
- (3) To prevent fluid overflow from the atomizing cup during color change, set the turbine speed around 20,000 to 25,000 rpm and set up to completely return the fluid to the drain during color change.
- (4) To prevent the purge air from flowing from the fluid hose into the bell cup during color change, minutely adjust the ON/OFF timing of each valve.

④ Bell cup cleaning thinner passages

This machine has integrated thinner passages to clean the bell cup automatically. Nozzle hole clogging and “dirt in finish” due to scattering of paint residue can be prevented by removing fluid deposit from the bell cup.



- (1) For bell cup interior cleaning, discharge thinner at the rate of 500 to 1000 mL/min (ANR) with continuous flow lasting for 3 seconds or less.

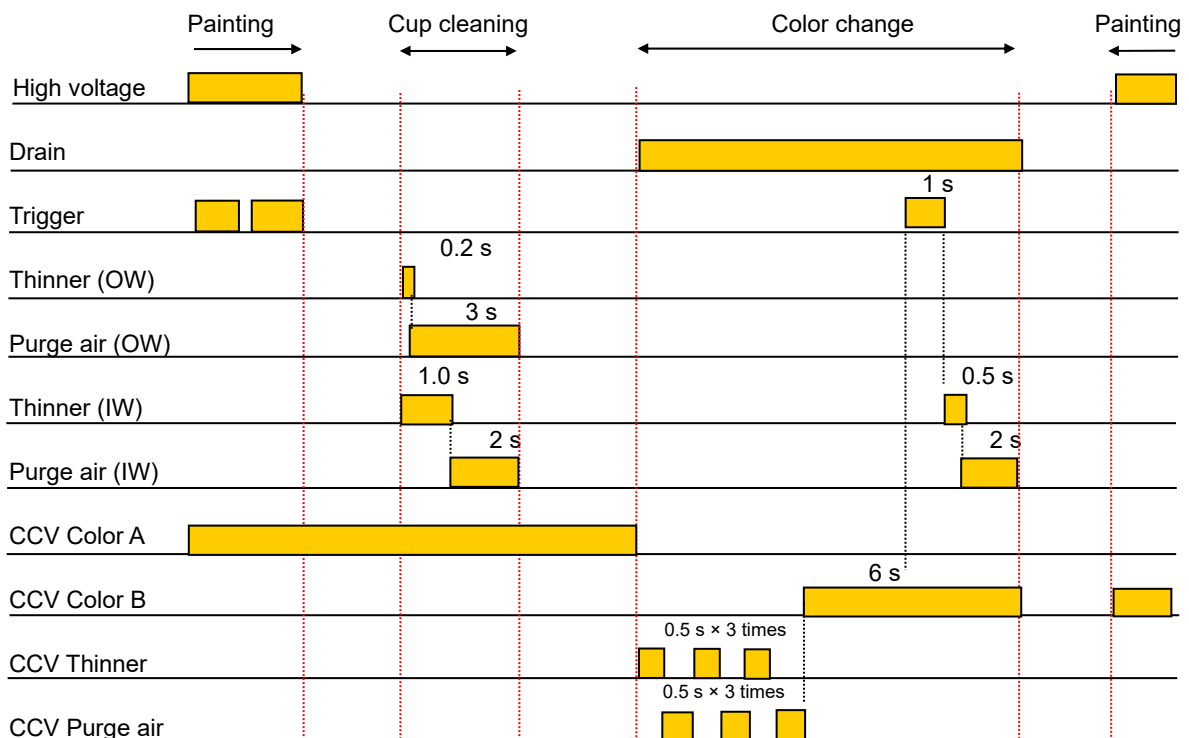
**CAUTION**

**If the thinner discharge rate is insufficient, dirt tends to accumulate over time. If accumulation grows too much, thinner may overflow from the bell cup.**

- (2) Use thinner with 100 MΩ-cm or more resistance (as measured with the Asahi Sunac Electrostatic tester). It prevents static electricity from leaking to the ground through the fluid passages. If the thinner resistance is lower, air-purge the fluid passages in the gun after flushing to exhaust thinner.

- (3) For cup exterior cleaning, discharge thinner at the rate of 300 mL/min or less for 0.5 second or less, to be followed by air blow (at 0.3 MPa or higher). This prevents thinner from splashing over the shaping air cap as the cup revolves.

<Valve Operation Sequence Chart: Sample>



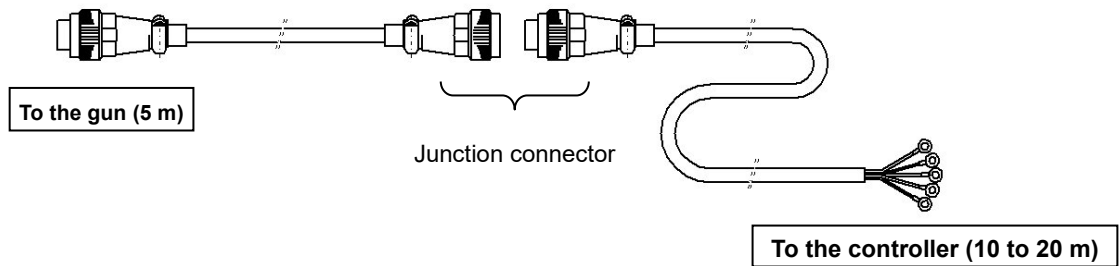
## ⚠ CAUTION

Bell cup cleaning should be conducted periodically. Particularly for metallic paints which dry quickly, air drying paints, and primer paints with high pigment content, the system structure should be designed so that cleaning can be conducted every time when workpiece painting is finished.

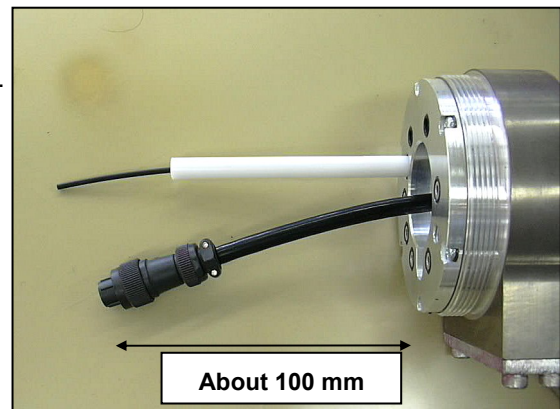
Continuous painting may cause, depending on the paint, failure due to contamination or clogging of the cup, resulting in fluid backflow into the air spindle and rotation failure. Cleaning timing should be set depending on the fluid characteristics.

### ⑤ Connection of connection cable

The connection cable consists of two cables. Connect the cable with the following procedure.



- (1) Before installing the gun, run the connection cable through the center hole of the bracket, and take out the cable about 100 mm extra from the tip of the connector.



- (2) Install the connection cable so that its surface will not be caught in the machine or damaged. To prevent connector contact failure, give the cable some slack so that there will be no tension in the cable when the gun moves.
- (3) To prevent noise interference, route the connection cable apart (at least 300 mm) from other power cables.

## ⚠ CAUTION

The connection cable performs feedback control with the electrostatic controller by detecting the current from the power pack, as well as power transmission to the power pack which is built in the gun.

External noise interference may cause malfunction being considered to be electrostatic abnormality.

### ⑥ Connection of fiber optic cable

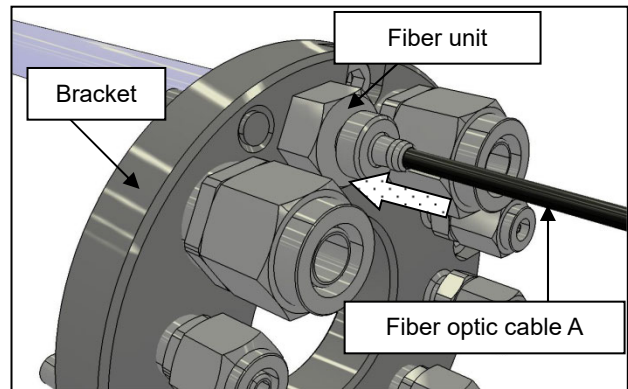
Connect the fiber optic cables (395F·395F-1, 392B) with the following procedure.

## ⚠ CAUTION

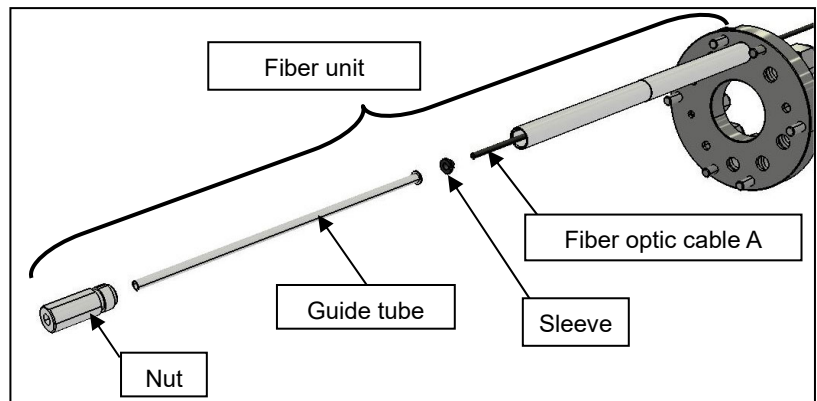
Install the fiber optic cables so that they will not be bent or folded by a hose or machine. When installing, take care not to damage or contaminate the lens at each end of the fiber optic cables.

- (1) After arranging the fiber optic between the control boards as well as other tubes, insert the tip of the fiber optic cable A in the fiber unit which is set up in the bracket with the connector and the protection tube passed.

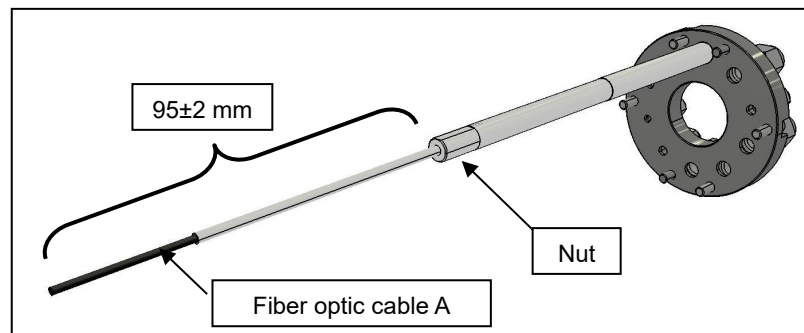
At this time, remove the nut, guide tube and sleeve of the fiber unit.



- (2) Insert these parts removed beforehand in order of the sleeve → guide tube → nut to the fiber optic cable A that projects from the tip of the holder.



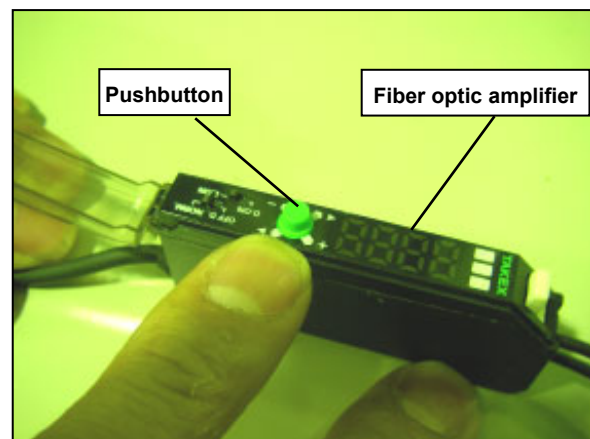
- (3) Before fixing the nut, adjust the projection length of the fiber optic cable A to  $95 \pm 2$  mm from the nut end while gradually tightening the nut, and then fix the nut.

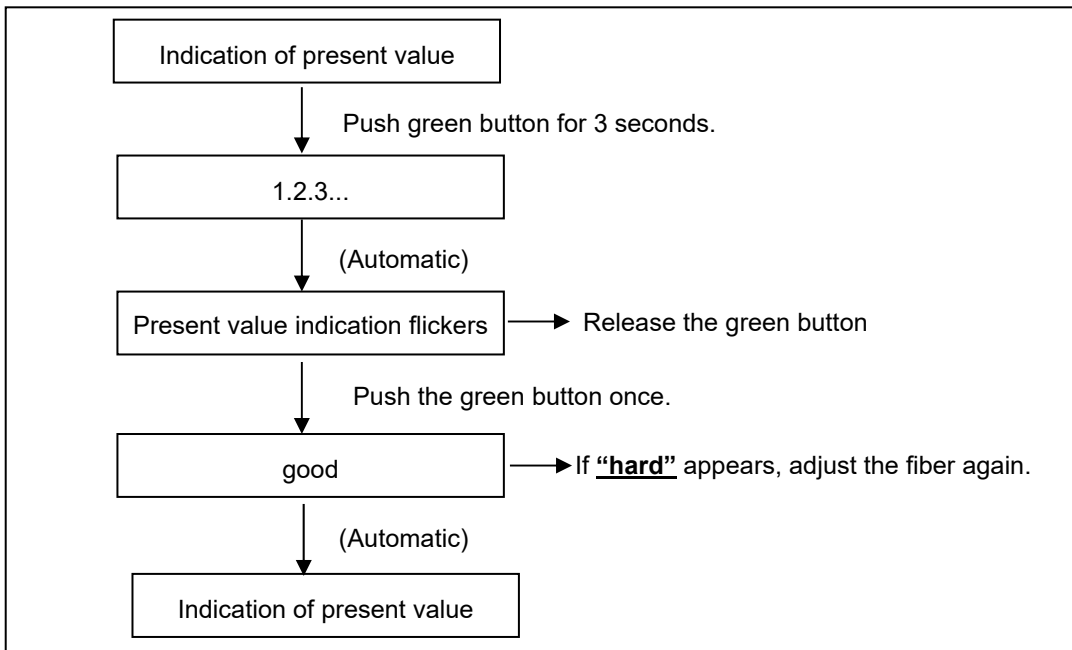


- (4) Install the bell body, check the value of the fiber optic amplifier, and perform auto-tuning.

※ Exercise care so that thinner or dirt does not adhere to the tip of the fiber optic cable.  
 ※ If it is damaged or contaminated, cut it using the attached fiber cutter, and perform adjustment of projection and auto-tuning of the amplifier.

※ Perform the procedure in Step (3) for fine adjustment until the appropriate value for the fiber amplifier, which is described in the reference below, is obtained.



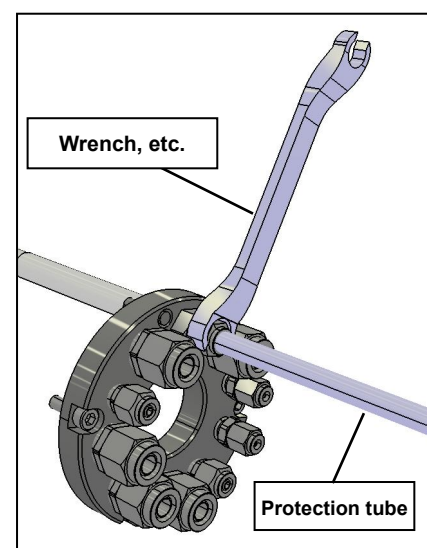


- (1) Set the bell cup and rotate softly by hand.
  - (2) The high value and low value alternately is displayed on the fiber optic amplifier when the bell cup rotates.
  - (3) The high value shows a value when the volume of feedback light is big and the low value shows a value when the volume of feedback light is small. Please adjust the position of the fiber optic cable in the bell painting machine to make the high value 500 or above and the difference between the high and low values 300 or above.
- ※ Fiber Optic amplifier should be used in “HISPEED MODE”.

[Reference] Examples of optical fiber amplifier value setting

Value H	Value L	Difference	Judgment
1800	200	1600	Good (Near to adequate)
800	70	730	Good (Adequate)
400	15	285	<b>Require re-adjusting. (Too far or improper end face)</b>
250	5	245	<b>No good (Get unstable at high speed)</b>

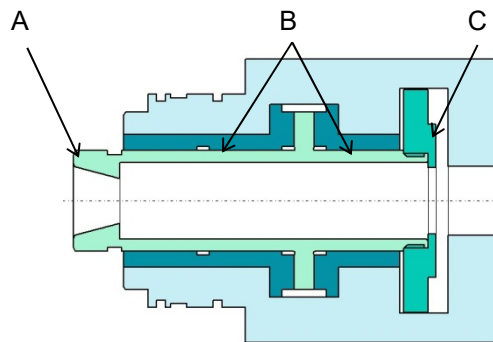
- (1) When fiber optic cable A adjustment is completed, after confirming the nut of fiber optic cable A is fixed, tighten with the nut and fix the protection tube to the holder of the bracket.



# 5

## Operation Procedure and Precautions

### ① Air spindle



A: Shaft  
B: Air bearing  
C: Turbine

#### (1) Air spindle operation procedure and precautions

Follow the operation procedure described below.

Failure to do so may result in damage to the air bearing, causing equipment failure or breakage.

Always be careful with the shaft that revolves at a high speed in order to avoid getting injured.

- 1) Before you run the air spindle, make sure that the shaft is not revolving.  
If it is, don't try to stop it by touching the cup by hand.

### CAUTION

**The shaft keeps on turning for a while on inertia even after the turbine air is turned OFF. The monitor may indicate “0 rpm” when the spindle is still running at around 100 rpm. If you touch the bell cup or shaft by hand at this time, you may get injured.**

**When inspecting or servicing, always see that the bell cup and shaft have come to a complete stop.**

- 2) Before turning ON the turbine air, always make sure that the bearing air pressure is 0.5 MPa or higher, and that the shaft turns smoothly when lightly pushed by hand.
- 3) Always keep the shaft nose I.D. taper, into which the bell cup is mounted, free from paint. Each time you mount or remove the bell cup, be sure to clean it.

### CAUTION

**If you turn the shaft with the bell cup mounted with contaminated paint on, the air bearing may get damaged.**

- 4) Always interlock the fluid valve ON/OFF solenoids so that the fluid valves will automatically turn OFF when the turbine speed drops to 10,000 rpm or less.
- 5) At the completion of an operation or when shutting OFF the air supply, always stop the turbine air and, after waiting for 3 minutes or longer, check that the shaft is no longer turning. If the bearing air supply is shut off when the shaft is still turning on inertia, the air spindle gets damaged.
- 6) When you stop the turbine air in manual mode, always make sure, in advance, that all the fluid valves are closed or no mist is coming out of the cup.

## (2) Air spindle repair

If you install and use the air spindle properly, you can enjoy high performance over many years. However, when the shaft does not turn lightly by hand even with the bearing air ON, or when the air spindle does not rev up to the rated rpm, you may have to replace it with a new one or a repair may be needed. Please contact us, Asahi Sunac.

### CAUTION

**Do not disassemble the air spindle.**

**The air spindle is made up of high precision parts and, once you take them apart, you may not get its original performance back when you put them together. Please note that, once the air spindle is disassembled, it will no longer be covered by our warranty.**

## ② Bell cup and shaping air cap

(1) Mounting and removing Before you mount or remove the bell cup, see that, with the bearing air supplied, the rotation of the shaft is completely stopped and that electrostatic high-voltage generator has been turned OFF.

- 1) After checking that the shaft nose I.D. taper is free from contamination, hold the shaft with the attached flat spanner (metal), and screw the bell cup by hand to mount it.
- 2) Hold the bell cup with the attached pad and fix the bell cup by hand. Do not use any tools other than the attached tool, like adjustable wrench, etc. (If the width portion on the bell cup is contaminated with fluid deposits, you will have no alternative but to use an adjustable wrench, etc. When the bell cup is damaged or deformed as a result, replace it with a new one.)



- 3) Screw the shaping air cap into the gun by hand. Then the mounting procedure has been completed. At this time, do not tighten while holding the counter electrode.

## (2) Handling of bell cup

This painting machine uses a precision air bearing.

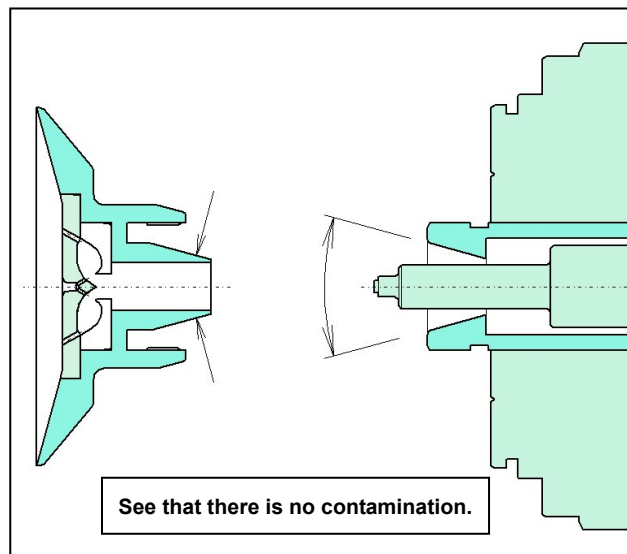
The mounted bell cup normally runs as fast as 20,000 to 40,000 rpm. So, if you don't handle it properly, imbalance will occur to the bell cup, causing serious damage to the air bearing.

To operate the equipment to the best performance all the time, conduct the following inspections before and after operation.

- 1) Before mounting the bell cup, put a needle (0.8 mm or smaller in dia.) through the fluid bore in the bell cup to see that it is not clogged.
- 2) To ensure the alignment between the bell cup and the shaft, always keep both male and female tapers free from fluid deposits.

### CAUTION

**If you set the bell cup with its tapers contaminated with paint, imbalance will occur when the bell cup is rotated by the air spindle at a higher RPM, resulting in damage to the air spindle.**



- 3) Wipe off the fluid deposited on the nozzle with a soft cloth when taking off the bell cup. At this time, exercise care so that fluid may not be transferred to the female taper in the shaft I.D.
- 4) At the end of each shift, every eight hours' operation as a guide, clean the bell cup with a highly soluble thinner, air blow the inner and outer surfaces, and check the taper and the fluid bore.
- 5) When dipping the bell cup into thinner, take care so that nothing will come into contact with the cup.  
Place the bell cup carefully with the cup edge facing down.

### CAUTION

**If you drop the bell cup or it is hit by something, be sure to replace it with a new one.  
With a deformed bell cup, imbalance will occur when it is rotated by the air spindle at a higher RPM, resulting in damage to the air spindle.**

### CAUTION

**The paint mist might flow to the main body side when the amount of shaping air is too low and the dirt increase of gun.**

# 6

## Maintenance and Periodic Inspection

### ① Post-operation cleaning

#### (1) Cleaning of gun body

- 1) With the air cap and bell cup mounted, carefully clean the body cover (shroud) with a clean cloth soaked with thinner.
- 2) If the contaminants do not go away, remove the body cover (shroud) and dip it into thinner for a few minutes and then wipe it off with a cloth again. (Do not immerse it in thinner too long.)

### ⚠ CAUTION

**Do not use a brush or scraper for cleaning. These tools leave scratches on the surface, making it liable to have deposition of contaminants. Once the surface gets contaminated, it will help electrostatic charges at the gun nozzle leak to the ground, causing electrostatic failure.**

### ⚠ CAUTION

**Do not spray the thinner using an air spray gun. Thinner entered into the gun can cause abnormal electrostatic hazards.**

#### (2) Cleaning of shaping air cap and bell cup

- 1) Clean the fluid passages inside the gun with thinner.
- 2) Make sure that electrostatic high-voltage generator has been turned OFF, remove electrostatic charges with a grounding rod, remove the shaping air cap, and remove the bell cup with the special spanner.
- 3) Immerse the bell cup in clean thinner. At this time, take care not to bring bell cups into contact with each other and cause scratches or dent.
- 4) Wipe off dirt on the air spindle shaft I.D. taper and the tip of the paint nozzle with thinner and a soft cloth.



No contamination with fluid allowed.

- 5) Clean the shaping air cap surface with thinner. If contaminants do not go away easily, take the shaping air cap apart and clean it together with internal parts.
- 6) Finally, remove the bell cup from thinner and, after thoroughly drying the inside and outside of the cup with blown air, install it to the air spindle.

## ② Periodic inspection

Conduct the periodic inspections in accordance with the table below in order to operate the machine to the best performance.

Item	Corrective measures	Frequency
Check the bell cup fluid hole for clogging.	Immerse in thinner and clean with blown air. If clogging persists after this, replace with a new one.	1 day
Check the feed tube end for contamination.	Remove contaminants with a soft cloth.	
Check the body cover (shroud) for contamination.	Remove contaminants with a soft cloth.	
Check bell cup for scratches and dents.	Replace with a new one.	1 week
Check the air spindle shaft nose I.D. taper for contamination.	Remove contaminants with a soft cloth.	
Check valve for proper functions.	If thinner leaks by drops from the gun nozzle when system fluid passages are filled with thinner, replace the fluid valve.	1 month
Check coil tube for internal contamination.	If paint deposits are seen over 50% or more of the entire length of tube, replace it with a new one.	
Check turbine air pressure.	If the air pressure is higher by 50% or more than the rated pressure, replace the turbine with a new one (or repair it) and exhaust any water or oil in the bearing air passages. Replace the filter as well.	
Check the mist separator for air spindle for contamination.	Replace filter.	1 year

## ③ Consumables

### (1) Coil tube set

Wear of the tube inner wall due to pigments and/or pigment deposits inside the tube can cause fluid passages to get clogged or failure due to contamination. Replace the coil tube periodically.

- 1) Coil tube change (when metallic fluid is used) ..... Every 6 months to year  
(The frequency may vary depending on the fluid characteristics.)

### (2) Mist separator element change

The machine uses a precision air bearing, so air management is extremely important. Periodic replacement is necessary.

- 1) Micro mist separator for air bearing ..... Every 6 months to year  
2) Air filter for turbine and pattern air ..... 1 year

# 7

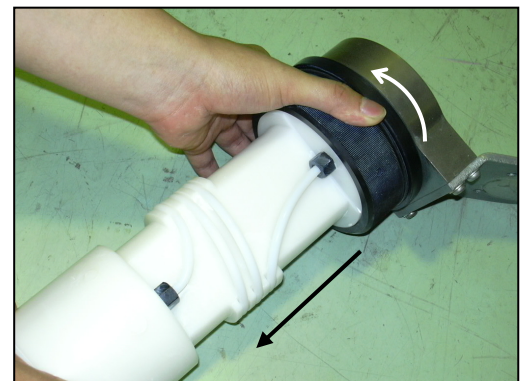
## Parts Replacement Procedure

### ① Removal and mounting of gun body

- After cleaning the fluid passages with thinner, release the pressure from the fluid passages. Shut OFF the turbine shaping air supply, and remove the shaping air cap and bell cup. Then, shut OFF the bearing air supply, and turn the shroud (13AE-014) to the left by hand to remove it.



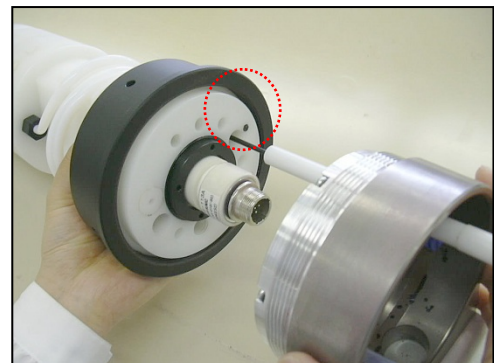
- Turn and loosen the retaining nut (13AA-013) that fastens the gun. While holding the gun body by one hand, remove the retaining nut and remove the gun straight.



### CAUTION

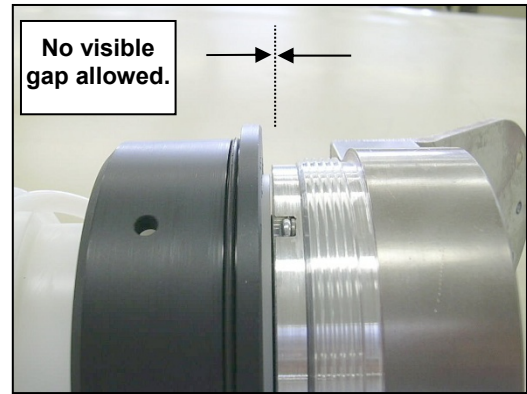
**Before you remove the gun, always shut OFF the bearing air supply. If you do not, compressed air may gush out from the joint between the gun and the bracket to blow out the thinner in a dangerous manner.**

- The connection cable is pulled out at the same time, so while holding the gun by one hand, loosen the connector of the connection cable and remove it. At this time, exercise care so that fluid or thinner may not come into contact with the end of each fiber optic cable.
- Handle the gun with care so that shock or force may not be applied to the air spindle shaft at the front end of the gun. Keep the gun in a clean environment so that dust may not get into passages including the bearing air passage.
- When mounting, check that all the O-rings are installed on the back plate and then run the fiber optic cables through the hole with a black pin on the mating face of the gun.



- While supporting the gun by one hand, install the connection cable to the gun.

- Check that the mating faces have come in close contact with each other with the gun pressed against the back plate by hand, and then tighten the retaining nut.



- Clean the inside and outside of the shroud with thinner, dry it completely, and then screw into the gun by hand.
- Before performing a functional check, be sure to supply the bearing air and rotate the air spindle shaft by hand to check with eyes that it continues turning smoothly. If the air leaks from the joint between the gun and the bracket, check connections again.

## ⚠ CAUTION

**Supplying the turbine air with the bearing air leaking decreases the air pressure to the air spindle, resulting in a very short service life and/or damage.**

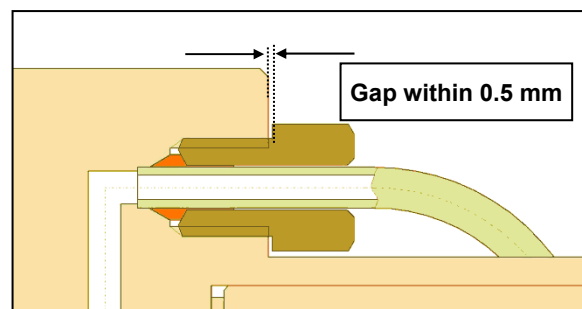
- After supplying the bearing air, perform auto-tuning of the amplifier for rotation detection, which is installed in the control panel.  
("4. Installation and Connections" ⑥ Connection of fiber optic cable -- (3))
- Finally, auto-tune the electrostatic controller (BPS300) with the gun.  
Apply the electrostatic charges with the bell cup and shaping air cap mounted and switch the electrostatic controller mode (M14). Then, the auto-tuning is completed within about a minute. The combination of the gun and the electrostatic controller for which auto-tuning is performed once will not require auto-tuning even if the gun is removed and mounted afterward.

### ② Coil tube

- Unscrew the nuts (Hex 14) that fasten the tube in place, disconnect the tube end from the gun, and wind the tube off.

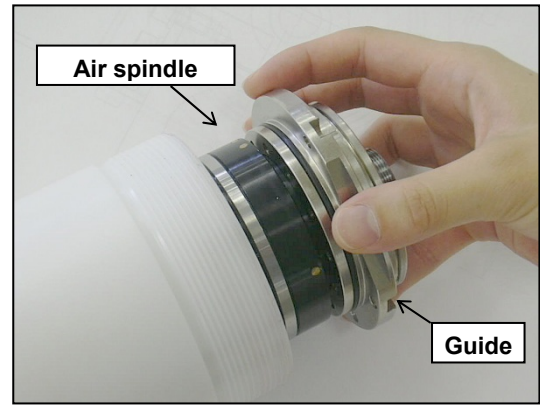


- When connecting, fully insert the one end of the tube into the gun and tighten the nut. At this time, see that the gap between the nut and the gun is within 0.5 mm. Wind the tube around the gun and fix the other end of the tube in place. After connecting each end, pull the tube by hand and confirm that it will not come off.

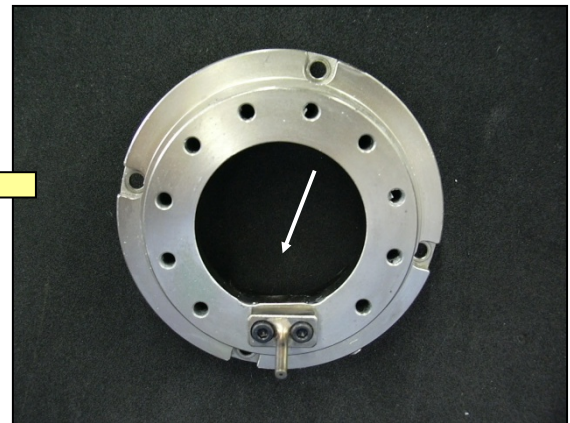
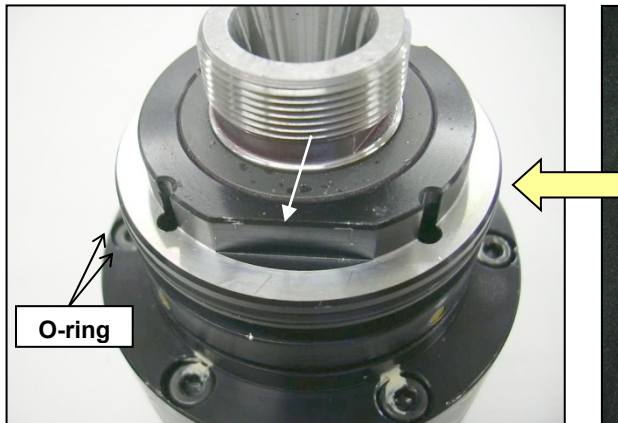


### ③ Air spindle

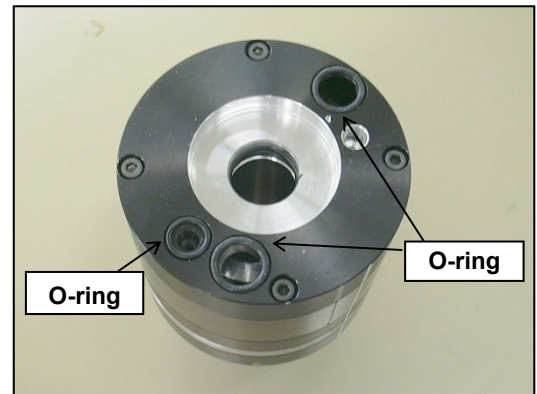
- Unscrew the four hex. socket head cap screws (M4 x 10) that secure the guide (13AA-003), and then pull off the air spindle holding the undercut portion of the guide near the shaping air outlet.
- Remove the guide from the air spindle (321-0016).



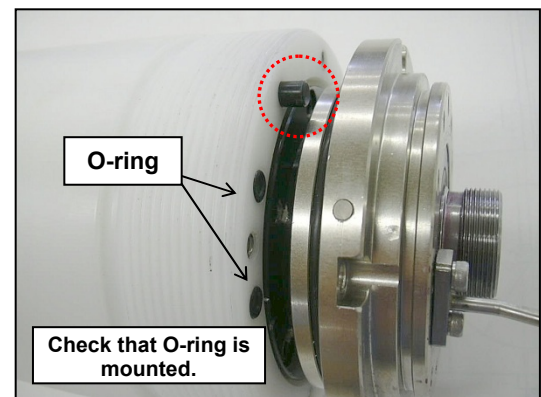
- To install, mount two O-rings (130-9050), and set the guide to the air spindle with the D-cut portion on the air spindle aligned with that on the guide.



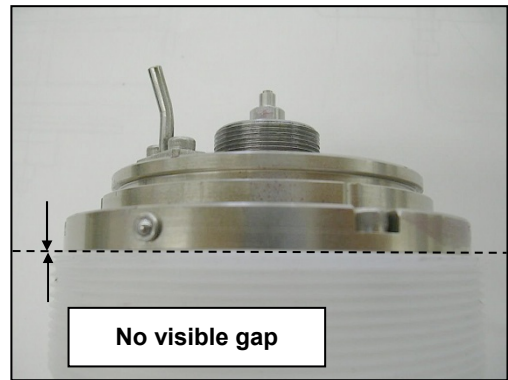
- Mount O-rings (101-9010: 2 pieces) (101-9007: 1 piece).



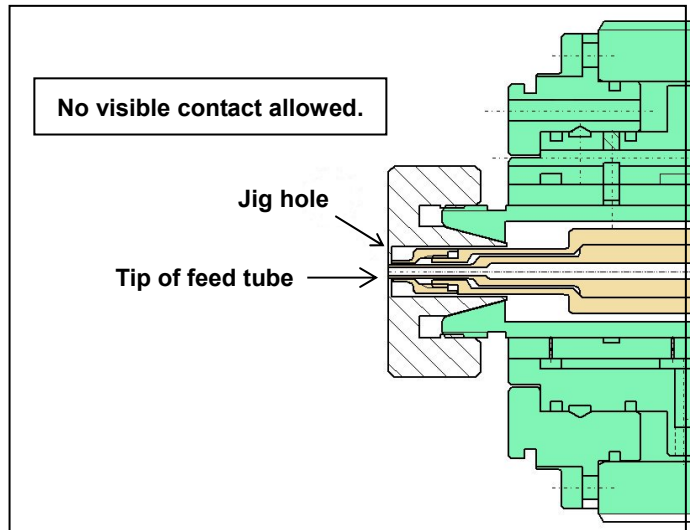
- Align the black pin on the gun with the hole on the guide, insert the air spindle in the gun, and then fasten it with mounting bolts (tightening torque 300 N·m). If the air spindle cannot be assembled properly here, the feed tube mentioned later has been installed incorrectly, so assemble it again.



- After tightening the bolt, check for gap between the guide and the gun body. If any, the O-ring may be incorrectly mounted in the air spindle or the feed tube may be incorrectly installed.

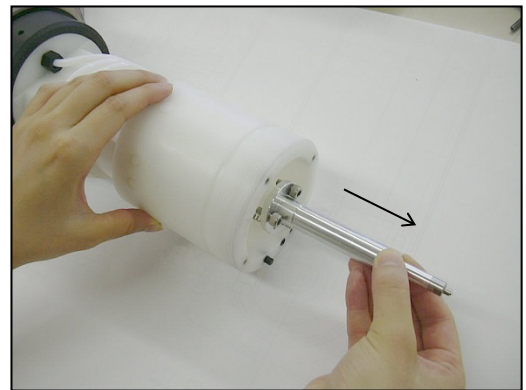


- Finally, set the special jig to the shaft and check that the center hole on the jig is not in contact with the feed tube.

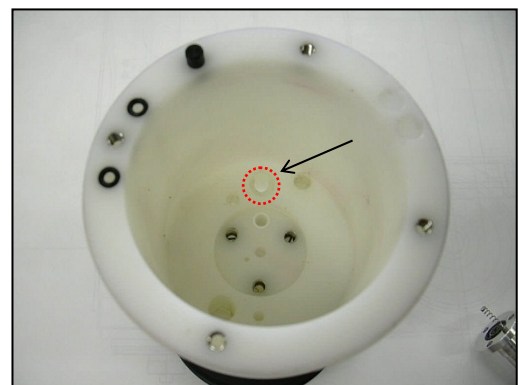


**④ Feed tube**

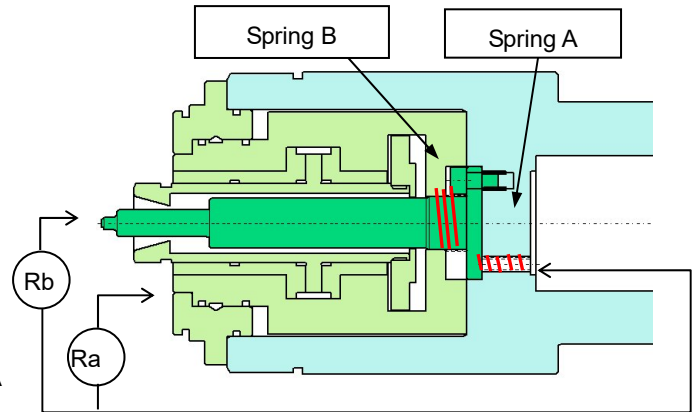
- Unscrew three hex. socket head cap screws (M5 x 10) with the attached hexagon screwdriver and remove the feed tube.  
Remove the extension (13AA-005) with the gun in the horizontal position to prevent the feed tube inside the extension from falling down.



- The end cap has left-hand threads. Turn the cap clockwise and remove it.
- Remove the spring A (13AA-009) and spring B (13AA-010) from the extension.
- When reassembling, put all the accessory parts on the extension, set the gun horizontally, and mount the extension assembly into the gun. At this time, set the assembly in a way that spring A will be inserted into the hole.

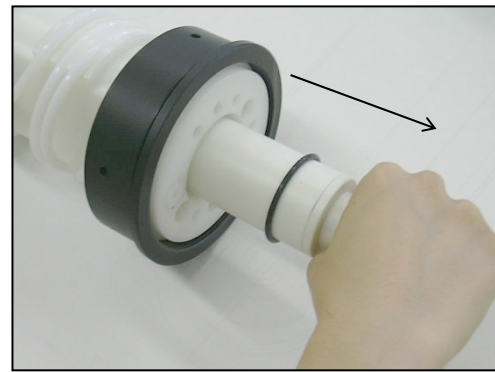


- Fasten with mounting bolts (tightening torque 300 cN·m).
- Finally, with the air spindle installed and the cascade removed, measure the resistance between spring A and the feed tube and that between spring A and the air spindle shaft using a tester to check that neither resistance shall be 10 Ω or less. If a higher resistance is found, remove dirt on the contacts on springs A and B respectively.



### ⑤ Cascade

- Using the special tool, loosen and remove the stopper (13AA-012).
- Hold the rear part of the cascade (13AE-011) with fingers and pull it off slowly and carefully. Exercise care so that thinner may not come into contact with the cascade connector.

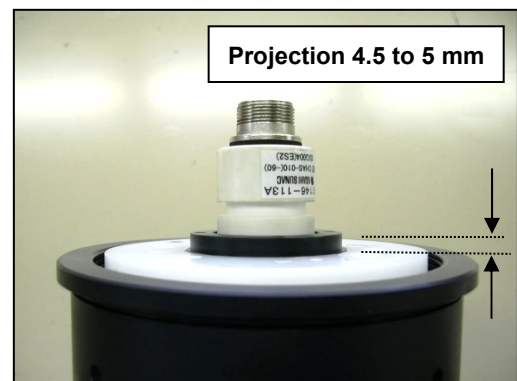


- Unscrew the cross-recessed flat head screw (69-70305) at the end of the cascade, and remove the packing (13AA-008) and contact (13AA-007).
- Wipe the cascade body with a thinner soaked clean cloth. After installing the parts, wipe the body again with an alcohol such as IPA to remove oils completely and dry them well.

## ⚠ CAUTION

**After wiping the cascade with thinner, do not air-blow. Oils, water and dust contained in the compressed air may stick to the cascade, resulting in an electrostatic failure.**

- Put into the gun carefully not to touch a large diameter portion by bare hand. Also, do not touch by bare hand the hole on the gun to which the cascade is to be inserted.
- Loosen and install the stopper using the special tool. At this time, see that the stopper projection from the gun end is between 4.5 mm and 5 mm.



# 8

## Troubleshooting

### ① Painting performance

Symptom	Cause	Remedy
<b>Fluttering spray</b>	Fluid flow insufficient, with leak dropping from feed tube.	Remove the bell cup and adjust the fluid flow so that fluid may flow through feed tube continuously.
	Air gets into fluid passages.	Check the remaining fluid amount and pump suction seat.
<b>Decreasing fluid flow</b>	Clogged fluid valve seat	Remove the fluid seat and clean the seat and orifice.
	Fluid deposition on inside wall of fluid passage in valve	Take passage apart and clean.
		Review the solubility of cleaning solution and cleaning method.
	Valve functional failure	Replace the coil tube set with a new one.
Check the operating air pressure for valve. Check the solenoid valve for proper functioning. Replace the valve.		
<b>Fluid will not stop flowing when shut off</b>	Fluid residue, dust on valve seat.	Remove the fluid seat and clean the seat and orifice. At the same time, clean the fluid passage.
	Valve functional failure	Check the operating air pressure for valve. Check the solenoid valve for proper functioning. Replace the valve.
<b>Orange peel</b>	Bell cup surface too dry.	Shorten the thinner cleaning time of bell cup.
		Reduce the turbine RPM.
		Make slower the dryness of thinning solvent.
<b>Fish eye</b>	Fluid accumulation in bell cup groove or wear	Remove contaminants. Review cleaning method. Replace the bell cup with a new one.
	Scratches or dent at bell cup edge.	Replace the bell cup with a new one.
<b>Paint film too thin</b>	Electrostatic not effective.	Reduce the bell cup RPM.
		Make slower the dryness of thinning solvent.
	Improper painting environment.	Reduce the speed of gun. Adjust the paint booth air flow speed to 0.3 to 0.4 m/s.

② **Painting machine**

Symptom	Cause	Remedy
<b>Turbine will not rotate.</b>	Fluid backflow due to the overflow from cup into turbine.	Shorten the thinner cleaning time of bell cup. Clean the bell cup fluid hole. Review the solubility of cleaning solution and cleaning method. Make slower the dryness of thinning solvent. Adjust the gun operating attitude to level or an angle that will get gun to point down.
	Fluid discharged at bell cup stop flowing into turbine.	Check the fluid valve. Replace as required. Relieve the pressure from the fluid passages at the end of painting operation. Check to see that interlock is triggered at 10,000 rpm.
	Turbine seizure	Check to see that bearing air pressure is always maintained at 0.5 MPa or more.
		Cup imbalance due to contaminated tapered bell cup mounting surface → Clean shaft and bell cup tapered surfaces. (See “Handling of bell cup” in this manual.)
Imbalance due to dent made when bell cup was dropped → Replace it with a new one. Look into other bell cups, as well. Imbalance due to accumulated pigments in bell cup → Review bell cup cleaning method.		
<b>No turbine speed display</b>	Fiber optic cable comes off.	Check to see that the length of fiber optic projection into gun is appropriate. Adjust so that there will be no tension in the cable as gun moves.
	Contaminated fiber optic cable end and turbine rotor.	Cut the end face with a special cutter. Confirm that paint or thinner does not get inside the gun. (See “Fluid overflow from bell cup.”)
	Fiber optic cable is kinked.	Replace the fiber optic cable with a new one.

### ③ Electrostatic

Symptom	Cause	Remedy
<b>Electrostatic abnormality occurs.*1)</b>	Safety circuit in the electrostatic controller BPS300 is activated.	Check the gun-to-object distance and adjust it to a distance at which no electrostatic failure occurs. Adjust the hanger or conveyor so that painting object does not sway. Check to see if the gun approaches the painting object too fast; take measures against object swaying.
	Humidity too high in fluid booth	Paint with reduced voltage.
	Water in air passages.	Purge the water from air pipes and air passage in the gun.
	Gun contaminated with fluid	Clean the cover and gun body to remove fluid deposition, using thinner with high volatility*2), then air blow to dry well.
	Fluid resistance too low allowing current to flow through fluid passage to ground.	Adjust the fluid to appropriate resistance value*3).
	Metallic particles deposited on inside wall of fluid hose allowing current flow through fluid passage to ground.	Clean the fluid passages with thinner. *4) Review cleaning timing chart.
		Replace the spiral tube set with a new one.
	Poor connector cable connection or disconnection.	Replace the connector cable.
	Mixing of surrounding noise in the electrostatic controller BPS300.	Take countermeasures against noise. (See the “Electrostatic Controller BPS300” manual.)

## NOTE

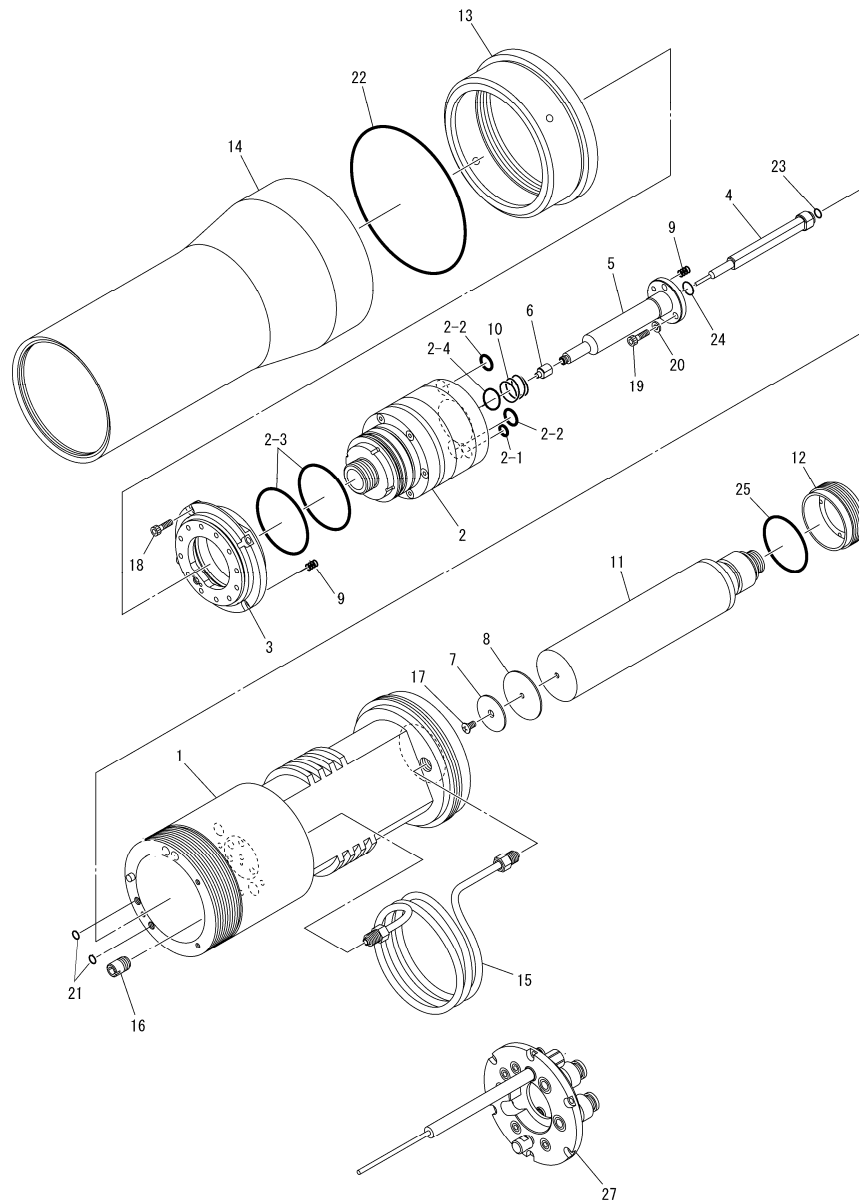
- \*1) See the “Electrostatic Controller BPS300” manual for details about electrostatic failure display.
- \*2) Always wipe off with a thinner soaked clean cloth. Do not spray the thinner with a spray gun for cleaning.
- \*3) Adjust the fluid resistance value so that it can be used with 80  $\mu$ A or less on monitor display.
- \*4) While the way metallic particles precipitate differs from one fluid to another, to play it safe, thoroughly flush fluid passages with thinner at the end of each painting operation.

# 9

## Exploded Diagram and Names of Parts

ESA120

13AE



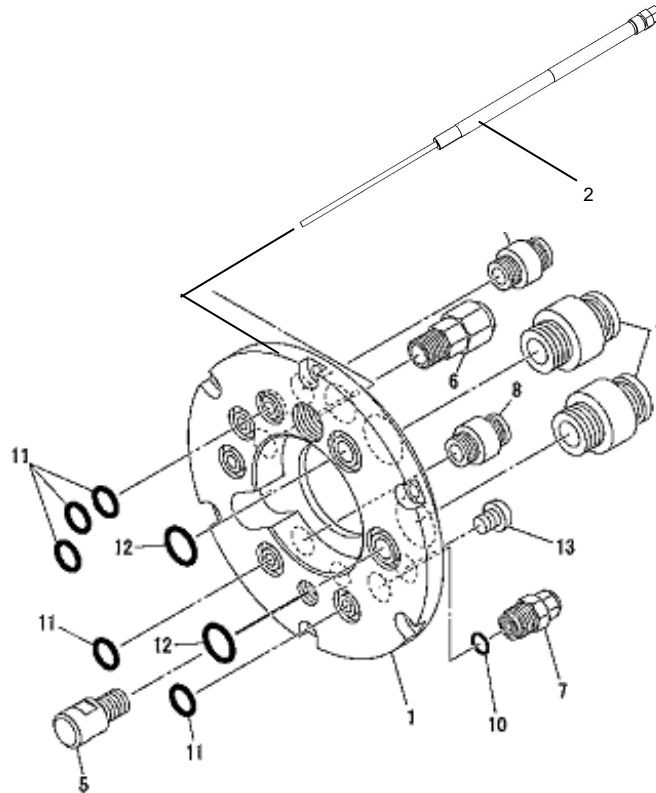
### SUNBELL ESA120

No.	Part No.	Part name	Qty	Remarks
1	13AE-001	Body	1	
2	321-0016	Air spindle	1	
2-1	101-9007	O-ring	1	
2-2	101-9010	O-ring	2	
2-3	130-9050	O-ring	2	
2-4	101-9016	O-ring	1	
3	13AA-003	Guide	1	
4	13AA-004	Feed tube	1	
5	13AA-005	Extension	1	
6	13AA-006	Cap	1	
7	13AA-007	Contact	1	
8	13AA-008	Packing	1	
9	13AA-009	Spring A	2	
10	13AA-010	Spring B	1	
11	13AE-011	Cascade	1	
12	13AA-012	Stopper	1	

No.	Part No.	Part name	Qty	Remarks
13	13AA-013	Retainer	1	
14	13AE-014	Shroud	1	
15	13AE-015	Coil tube set	1	
16	13AE-016	Tube guide	1	
17	69-70305	Cross-recessed countersunk head machine screw	1	
18	03-70410	Hex. socket head cap screw	4	
19	03-70512	Hex. socket head cap screw	3	
20	360-0118	Ribbed lock washer	3	
21	130-9004	O-ring	2	
22	130-9110	O-ring	1	
23	101-9004	O-ring	1	
24	101-9014	O-ring	1	
25	102-6040	O-ring	1	
26	357F	Accessory tool	1	
27	149A-1	Bracket	1	
28	13EC-037	Grounding wire	1	Accessories

## Bracket

149A-1



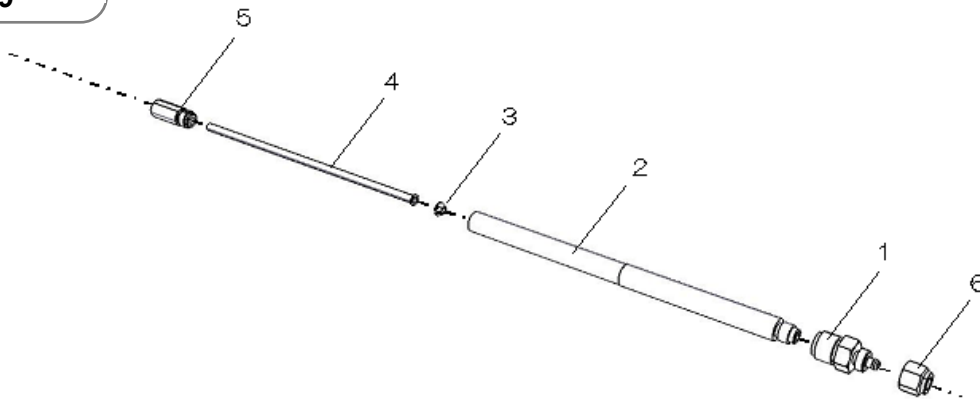
### Bracket

No.	Part No.	Part name	Qty	Remarks
1	149A-001	Bracket	1	
2	1709	Fiber unit	1	
3		Nil		
4		Nil		
5	149A-005	Bolt	1	
6	342-0123	Nipple	2	
7	342-0133	Nipple	1	

No.	Part No.	Part name	Qty	Remarks
8	378-0601	Straight with hex. socket	2	
9	378-1003	Straight with hex. socket	2	
10	101-2006	O-ring	1	
11	101-9007	O-ring	5	
12	101-9010	O-ring	2	
13	12-10510	2-point sems screw	1	

## Fiber unit

1709

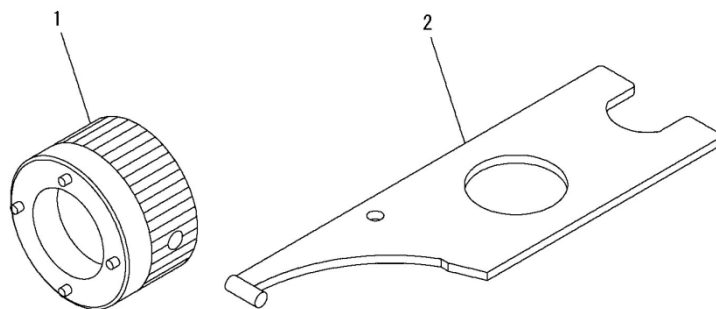


No.	Part No.	Part name	Qty	Remarks
1	14A5-001	Connector	1	
2	1709-002	Fiber holder	1	
3	1709-003	Sleeve	1	

No.	Part No.	Part name	Qty	Remarks
4	14A5-004	Teflon tube	1	
5	1709-005	Nut	1	
6	342-0162	Cap nut	1	

## Accessory

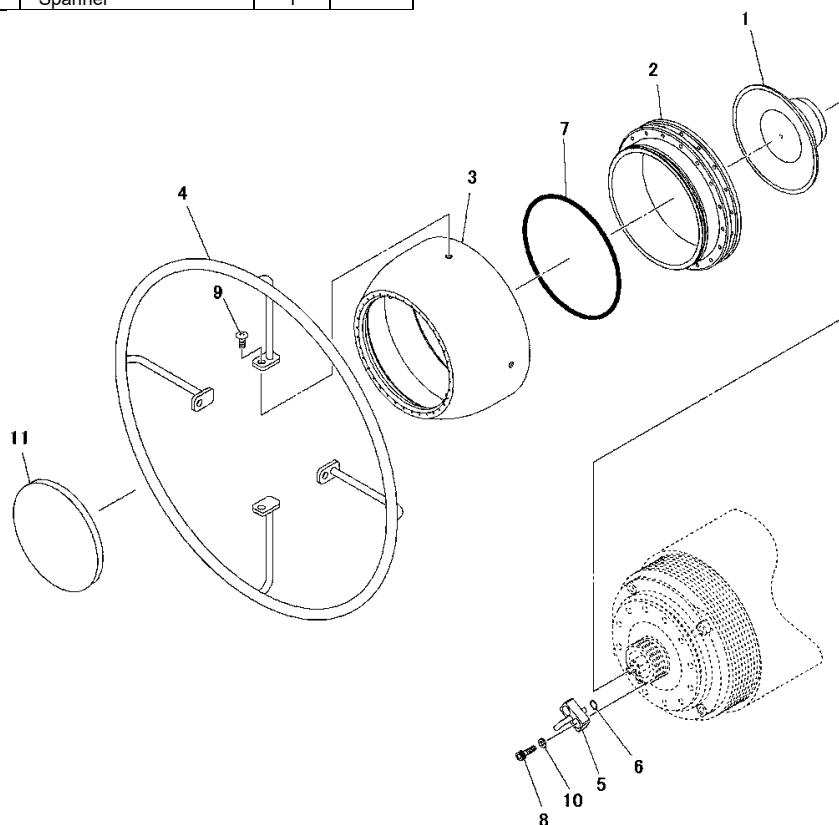
357F



## Accessory tool

No.	Part No.	Part name	Qty	Remarks
1	357F-001	Box wrench	1	
2	357F-002	Spanner	1	

No.	Part No.	Part name	Qty	Remarks
3	334-2040	Screwdriver type hex.wrench	1	HEX4



## Air cap set

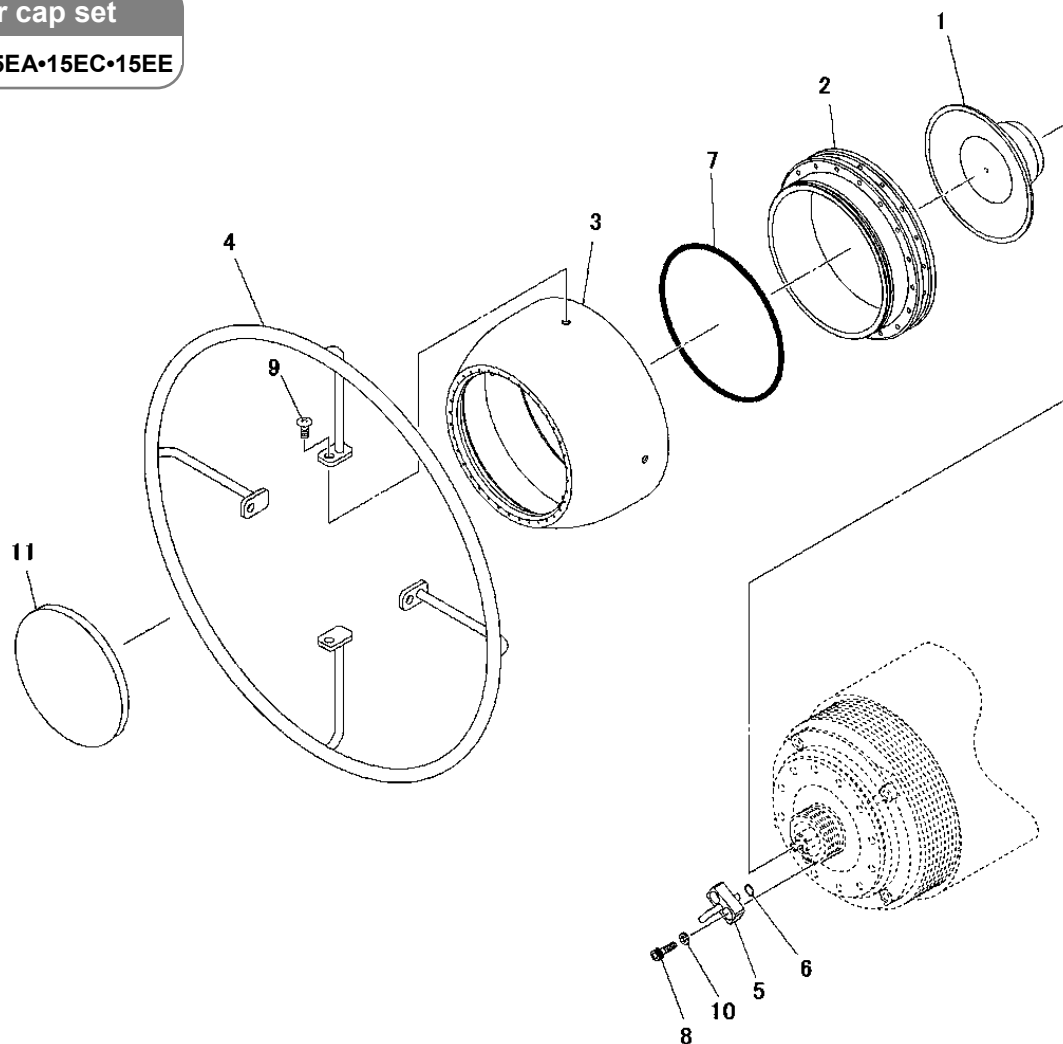
No.	Part No.	Part name	Qty	Remarks
1	157C-101	Cup	1	
2	157C-002	Sleeve	1	
3	157C-003	Cap	1	For 157C-1
	159A-003	Cap	1	For 159A-1
	157E-003	Cap	1	For 157E-1
4	157C-004	Counter electrode ring	1	※
5	157C-005	Nozzle	1	

No.	Part No.	Part name	Qty	Remarks
6	130-9004	O-ring	1	
7	130-9070	O-ring	1	
8	03-70308	Hex. socket head cap screw	2	
9	71-70405	Cross-recessed truss head screw	4	※
10	41-70300	Spring washer	2	
11	157C-012	Pad	1	

Remark: The air cap set can be used with the counter electrode ring removed. In this case, use No. 9 screws with a shorter screw length (71-70404) in place of Part No. 9.

## Air cap set

15CF•15EA•15EC•15EE



### Air cap set

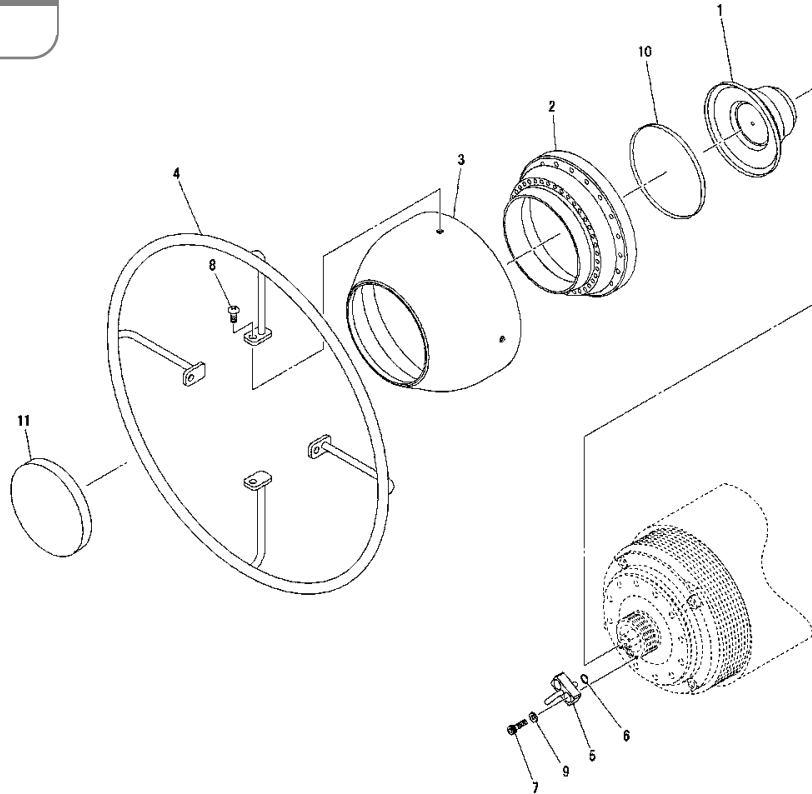
No.	Part No.	Part name	Qty	Remarks
1	15CF-001	Cup	1	
2	157C-002	Sleeve	1	
3	157C-003	Cap	1	For 15CF
	159A-003	Cap	1	For 15EA
	15EC-003	Cap	1	For 15EC
	157E-003	Cap	1	For 15EE
4	157C-004	Counter electrode ring	1	※
5	15CF-005	Nozzle	1	

No.	Part No.	Part name	Qty	Remarks
6	130-9004	O-ring	1	
7	130-9070	O-ring	1	
8	03-70308	Hex. socket head cap screw	2	
9	71-70405	Cross-recessed truss head screw	4	※
10	41-70300	Spring washer	2	
11	157C-012	Pad	1	

Remark: The air cap set can be used with the counter electrode ring removed. In this case, use No. 9 screws with a shorter screw length (71-70404) in place of Part No. 9.

## Air cap set

157F



### Air cap set

No.	Part No.	Part name	Qty	Remarks
1	157F-001	Cup	1	
2	157F-002	Sleeve	1	
3	157F-003	Cap	1	
4	157C-004	Counter electrode ring	1	※
5	157F-005	Nozzle	1	
6	130-9004	O-ring	1	

No.	Part No.	Part name	Qty	Remarks
7	03-70308	Hex. socket head cap screw	2	
8	71-70405	Cross-recessed truss head screw	4	※
9	41-70300	Spring washer	2	
10	157F-010	Ring	1	
11	157F-011	Pad	1	

Remark: The air cap set can be used with the counter electrode ring removed. In this case, use No. 8 screws with a shorter screw length (71-70404) in place of Part No. 8.

# 10

## Maintenance Log

Please use record the details that you conduct a maintenance service, such as replacement of a part, tear-down cleaning, post-failure repair, etc.

Equipment name	SUNBELL <ESA120>		Purchase date:	
Date of service	Portion worked on	Description	Result	Who serviced
				In-house / Dealer / Asahi Sunac
				In-house / Dealer / Asahi Sunac
				In-house / Dealer / Asahi Sunac
				In-house / Dealer / Asahi Sunac
				In-house / Dealer / Asahi Sunac

Note: Due to continuous improvements and modifications, the configurations specified herein are subject to change without prior notice.

ASAHI SUNAC CORPORATION (the “Company”) shall provide the original purchaser (the “Purchaser”) with warranty service for a period of one (1) year from the date of purchase of the product, as follows:

- Should you find defects in design or workmanship with regard to parts, ship them back to the Company, with freight prepaid. The Company shall repair or replace the parts free of charge and reimburse the freight charges, provided that, as a result of an inspection and investigation of the parts conducted by the Company, the defects are deemed to be attributable to the factors within the Company’s responsibility.
  
- In the following cases, free after-sales service is not provided.
  1. Failure resulting from an inappropriate method of installing this equipment.
  2. Failure resulting from a use method not conforming to this instruction manual or mishandling.
  3. Failure resulting from insufficient maintenance management of this equipment and incorrect handling such as non-conformance to the procedures specified in this instruction manual.
  4. Failure resulting from unauthorized alteration or structure change of this equipment without the Company’s consent.
  5. Failure due to force majeure such as earthquake, disaster, flood disaster or lightning.
  6. Warranty for consumables worn or deteriorated even in the case where this equipment is used correctly.
  7. Repair when the machine has been used outside Japan, and shipping cost.
  8. In addition to the above, failure due to circumstances beyond our control.
  
- As for items such as parts purchased by the Company from another manufacturer, the warranty of that manufacturer shall apply.
  
- As for any parts deemed to be defective, the Company shall not be held liable for any expenses beyond the provision of repair or replacement parts free of charge.
  
- The Company shall not be held liable for any damage to the Purchaser caused by factors not attributable to the Company, such as misuse of product, etc.

- 
- When a transfer of title of this equipment takes place, please see to it that this Operation and Maintenance Manual is handed over to the new owner.
  - This equipment is manufactured in compliance with the Laws and Regulations of Japan.  
In the rare eventuality of this equipment being used outside Japan, compliance with the safety standards of the relevant countries is of course mandatory.
- 

22th Edition: June 25, 2025

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Sales office



English



Chinese

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