



Our products are produced as per international standards ISO9001

Instruction Manual

■ Electrostatic air hand gun

E-M15B series

E-M10B series



KEMA 0344



EN50050
BVS 05 ATEX E 027

Group II category2 gas atmosphere equipment
Suitable for use in Zone 1



This instruction manual contains **IMPORTANT WARNINGS, CAUTIONS** and instructions for safe operation. Before operation, be sure to read this instruction manual thoroughly and understand the equipment so that you can use it safely and effectively for a long time.

Keep this booklet in an appropriate place for immediate reference.

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Note:

- The operator and the supervisor of this electrostatic gun must fully read and understand Chapters from 1 to 3 and 4.3 to 4.5(P.9~11).
- Only the supervisor and / or other equally qualified personnel, having fully read and understood the contents of this instruction manual, can take care of matters related to Chapter 4 to 8.

■ Important information - Safety Precautions

This electrostatic air hand spray gun is exclusively used for electrostatic painting (we call it electrostatic spray gun from now on). Be sure to read and understand this instruction manual.

Both the supervisors and operators shall be fully knowledgeable about the requirements stated within this instruction manual, including important warnings, cautions and proper method of operation.

Wrong operation (mishandling) can cause serious bodily injury, death, fire or explosion.





Keep this booklet in an appropriate place for immediate reference.

This electrostatic spray gun is used along with related electrostatic controller (E-SC12-EX series: option) and paint pump (e.g. DPS-90D), etc. When using related equipment, also read instruction manuals for those products.




1. About safety

Pay special attention to items which are shown by below marks and symbols. Symbols and marks have the following meanings.

Indication of warnings and cautions

	WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in serious injury or loss of life.
	CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

Examples of warnings and cautions

	Indicates [You must be careful]. We will explain briefly in or near the symbol. (The example on the left is [Be careful about electric shock]).
	Indicates [You must not do]. We will explain briefly in or near the symbol. (The example on the left is [Do not touch]).
	Indicates [You must do]. We will explain briefly in or near the symbol. (The example on the left is [Be sure to ground it]).

✓ **We shall not be responsible for any injury or damage caused by disregard of warnings, cautions or instructions.**

Important	Indicates notes which we ask you to observe. They are helpful to fully achieve performance and functions of the equipment.
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■ Warnings and cautions for safe operation

WARNING

Fire and Explosion



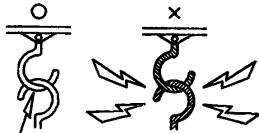
Avoidance of fire and explosion at painting site

- ❶ Never install it at a site with flammable goods or bring flammable goods like lighters. Paints and organic solvents are flammable, able to cause fire.
- ❷ Never use the following Halogenated Hydrocarbon solvents which can chemically react with spray gun parts (aluminum parts) etc., crack and melt them.
 - **Improper solvents:** methyl chloride, dichloromethane, 1,2-dichloroethane, carbon tetrachloride, trichloroethylene, 1.1.1.-trichloroethane
 (Be sure that all fluids and solvents are compatible with gun parts. We are ready to supply a material list used in the gun on request.)



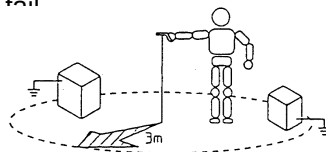
Avoidance of fire caused by grounding failure

- ❶ Be sure to keep hanger or conveyor clean without paint stuck on it and keep them conductive. Incomplete grounding, dirty hanger or conveyor cannot conduct electricity, and static electricity accumulates, resulting in fire accident by spark discharge.

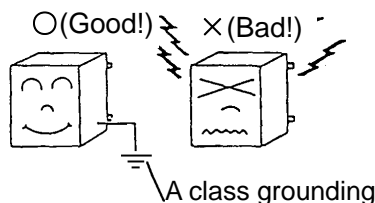


Be sure to contact metallic points by making contact points knife-edged or sharp-pointed.

- ❷ Store paint and solvent in a metallic container which is grounded. Poorly grounded conductor can accumulate static electricity, causing fire accident by spark discharge. If you are forced to place conductive goods such as fluid container and fluid supply pump within 3m from the gun, be sure to ground them without fail.



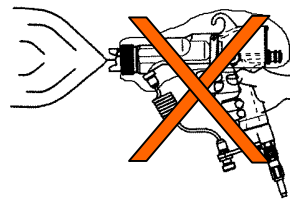
- ❸ Securely ground electrostatic controller (A class grounding : less than 10Ω). As you ground the electrostatic spray gun by contacting electrostatic controller through low voltage cable, incomplete grounding can accumulate static electricity on spray gun, causing fire accident by spark discharge or bodily injury by electric shock.





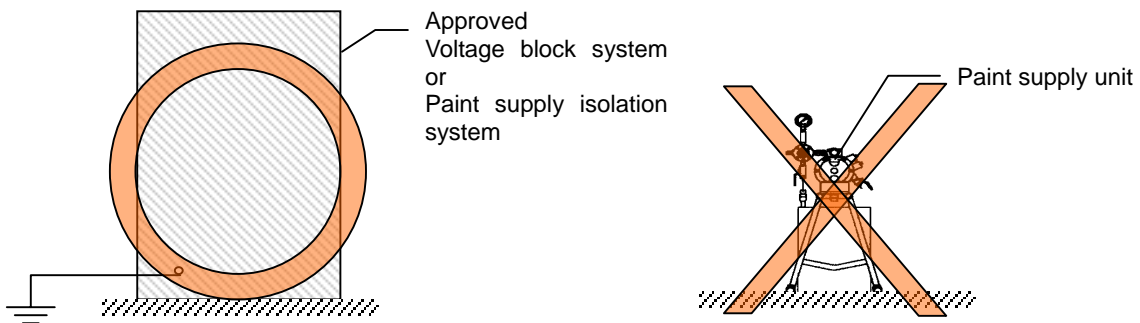
Avoidance of fire by ignition of paints and solvents

- ❶ Be sure to turn off electric source of electrostatic controller (E-SC12(-EX) series: option) before cleaning inside of fluid passages. As paints and solvents are flammable and have low flash points, they can catch fire if there is spark discharge in and around painting site.
- ❷ Spray distance between workpiece and painting equipment must be over 10cm. If the distance is less than 10cm, spark discharge can occur and paint can catch fire.
- ❸ Never use lacquer paints. Lacquer paints have low flash points and can catch fire.
- ❹ Do not cover electrostatic spray gun with anti-dust sheet. Static electricity accumulated on sheet can discharge and solvent gas can catch fire.



- ❺ The Model E-M10B for low resistance paints and water based paints, must be used with an Approved/Listed paint supply isolation/voltage block system rated for -40kV in order to provide operators protection from electric shock. If they are not insulated, paints and solvents can catch fire by discharge between grounded metals.

*) Refer to instruction manual of Voltage block system or Paint supply isolation system.



- ❻ When painting low resistance paints and metallic paints with electrostatic spray gun E-M10B series and using more than 2 guns at the same site, separate individual paint supply unit. If you try to use 2 guns with one set of paint supply unit and charge one gun only, the other gun, which is not charged, can be charged through paint. Then, paint and solvent can catch fire.

Wrong operation



Avoidance of wrong use

- ❶ Never point toward human or animal during spraying. If done, it can cause inflammation of eye or skin and bodily injury.
- ❷ Never use gas other than compressed air. If done, it can cause fire or poisoning accident.
- ❸ Never use at higher than max. operating pressure (refer to specifications on page 2).



Avoidance of wrong operation

- ❶ Before inspecting, cleaning, disassembling or assembling electrostatic spray gun, be sure to turn off electric source of electrostatic controller (E-SC12(-EX) series: option), interlocked equipment and equipment and fully release air and fluid pressure in the following procedure. If not, it can cause bodily injury by wrong operation.

Job 1) Turn off electric source of electrostatic controller (E-SC12(-EX) series: option) .



Job 2) Stop supply of compressed air, paint and solvent to spray equipment.



Job 3) Turn electrostatic spray gun downwards, pull trigger, operate fluid needle and fully release air pressure and fluid pressure.

Bodily protection

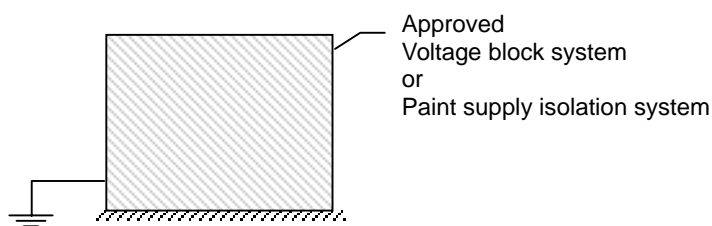


Protection from high voltage

- ❶ The Model E-M10B for low resistance paints and water based paints, must be used with an Approved/Listed paint supply isolation/voltage block system rated for -40kV in order to provide operators protection from electric shock.

Be sure to ground voltage block system. If not, it can cause bodily injury by electrostatic accident or electric shock since high voltage is charging voltage block system.

*) Refer to instruction manual of Voltage block system or Paint supply isolation system.



- ❷ When insulating and using paint, fluid hose and paint supply unit (electrostatic spray gun: E-M10B series + insulation stand) and touching electrostatic spray gun, paint supply unit or metal in painting site in order to clean and inspect painting equipment, be sure to turn off electric source of electrostatic controller and operate while ground wire or ground bar (grounded metallic bar) comes into contact with painting equipment.

If not, electric shock can cause bodily accident if charging is not turned off or ground is not connected, since high voltage is used.

◎operating order

Turn off charging of electrostatic controller and electric source.

In 10 seconds, make ground wire or ground bar contact with metal which operators touche during operation.

Operate while ground wire or ground bar comes into contact with metal.



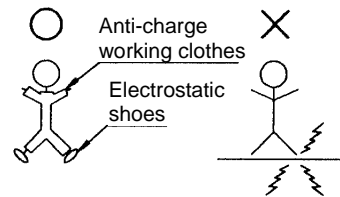
Protection from solvents, air and fluid pressure

- ❶ Use spray booth and do the painting job in a well-ventilated place. Painting and cleaning jobs in a poorly ventilated site can cause organic solvent poisoning and ignition.
- ❷ Always wear protective tool such as protective goggles and mask. If not, cleaning liquid can touch eyes and skin, causing inflammation. If you feel something wrong with eyes or skin, immediately consult with a doctor.
- ❸ We recommend you to wear earplugs for your safety. Noise level can reach over 85dB(A) depending on operating and working conditions.
- ❹ Be sure to turn off electric source of electrostatic controller or multi-gun control system and release fluid and air pressure before cleaning, disassembling or doing maintenance job or during stoppage of job. If not, remaining pressure can cause bodily injury through wrong operation and spattering of cleaning liquid. Be sure to follow [Avoidance of wrong operation] on page ④ in order to turn off electric source, and release air and fluid pressure.

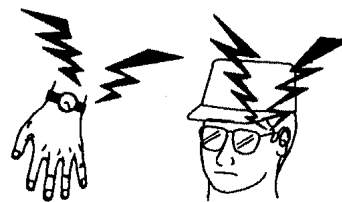


Protection from static electricity

- ❶ Be sure to wear electrostatic shoes (resistance figure $10^5 \sim 10^8 \Omega$, JIS T 8103) and anti-charge working clothes (JIS T 8118). If not, static electricity can accumulate on human body and cause bodily accidents by electric shock.



- ❷ Operators must not wear metallic things such as watch or key holders during operation. If done, static electricity can accumulate on them and you will get an electric shock. If you wear glasses with metallic frame and approach the gun, you can get an electric shock. Before approaching spray equipment, turn off electric source of electrostatic controller or multi-gun control system.

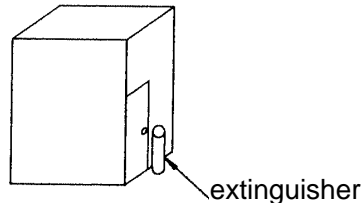


- ❸ Operators must always hold electrostatic spray gun with bare hand or glove having a large hole at palm position. As human body is grounded through the handle of electrostatic spray gun, static electricity can accumulate on human body and cause bodily harm by electric shock if operators hold the gun handle with normal glove.
- ❹ When you turn off main electric source switch in order to stop the gun operation in an emergency, it takes about 5 seconds till the electric potential of electrostatic spray gun goes down to a safe level. Don't try to touch the pin electrode at tip of gun during that period.

Others

❶ Never use altered parts or other than genuine parts when parts are damaged or worn out. If done, it can cause failure of the gun, accidents or bodily injury.

❷ Be sure to install a fire extinguisher at painting site.



❸ Make sure that the equipment has stopped before you enter the working range of other painting equipment (robot, reciprocator, etc.). If not, moving robot or reciprocator can injure you.

❹ Never use for food or chemicals. If done, erosion in paint passages can cause accidents, and foreign matter can enter.

❺ When paint becomes dry, do not use conductive paints. If done, static electricity can leak. Contact paint manufacturer for details.

❻ Be sure to use air hose and fluid hose we have designated.
General fluid hose and rubber hose can leak static electricity and damage isolation.



CAUTION

Maintain safety and functions of electrostatic spray gun



❶ Be sure to observe the following in order to maintain safety and functions of electrostatic gun:

- 1) Be sure to inspect and do the maintenance in accordance with 5. "Inspection and maintenance"(P.12).
- 2) Never immerse electrostatic gun body in cleaning thinner when cleaning gun. Clean electrostatic gun in accordance with 4.5 "Job-3 clean electrostatic air hand gun body and low voltage cable"(P.10).
- 3) Be sure to install and handle low voltage cable in accordance with 4.1 "precautions on installation and handling of low voltage cable" (P.5).
- 4) Handle electrostatic gun with care in order not to give it a jolt. Especially take care not to drop, hit or trample on it or move workpiece or hanger by tip of gun. If done, it can fail electrostatic spray gun.

1 Specifications

< For Operators and Supervisors >

1.1 Important specifications

Ambient temperature range	5°C~40°C
Ambient humidity range	Less than 70%RH
Max. operating pressure	Air : 0.68 MPa, Paint : 0.35MPa
Max. air and fluid pressure	5°C~43°C
Noise level (LAeqT)	85dB(A) : at 1m backward from gun, 1.6m height inlet air pressure 0.35MPa (recommended air pressure),
EX Spec. (CE ATEX regulation)	Group II , category 2 gas atmosphere equipment Suitable for use in zone1   II 2G 0.24mJ T6 <small>KEMA 0344 EN50050 BVS 05 ATEX E 027</small>

1.2 Main specifications

No.	Items	Specifications		Remarks
		E-M15B series	E-M10B series	
1	High voltage generation	Built-in high voltage booster		Cartridge system
2	Max. operating voltage	-40kV		During no-load
3	Max. operating current	100 μA		
4	Dimensions L×W×H	223×68×191		When fluid adj. knob is fully closed
5	Mass	510g		Without low voltage cable and fluid tube
6	Applicable electrostatic controller	Electrostatic controller E-SC12-EX series (option)		
7	Air nipple / fluid nipple thread size	G1/4 (air nipple)G3/8 (fluid nipple)	G1/4 (air nipple) G3/8 (cap nut)	E-M10B series includes Electrostatic fluid hose set. (10m)
8	Applicable paint ^{*1)}	General paint : Reference → electric resistance of paint is about over 10MΩ·cm ^{*2)}	Low voltage paint Reference → electric resistance of paint is about less than 10MΩ·cm ^{*2)}	Regarding metallic paint, please ask the shop which sold it to you.

*1) Regarding details of applicable paint, ask the shop which sold it to you or us.

*2) The figures are measured by our paint tester (EST-1B : option) after paint viscosity is adjusted.

1.3 Specification about atomization

No.	Items	specifications (□ : blank)			Remarks
		E-M1□B-13C1□	E-M1□B-13C2□	E-M1□B-13L1□	
1	Air cap set	Conventional atomization type		HVLP atomization type	
2	Fluid nozzle	Conventional atomization type		HVLP atomization type	Nozzle orifice φ 1.3
3	Standard spray air pressure (static pressure at gun handle)	0.30MPa		0.20MPa	
4	Air consumption	About 500NI/min	About 350NI/min	About 500NI/min	During continuous painting at standard spray pressure
5	Standard pattern width / spray distance	About 350mm/250mm When spraying 250ml/min	About 250mm/250mm When spraying 250ml/min	About 240mm/200mm When spraying 160ml/min	Melamine resin paint, paint viscosity 21sec/3FC

< How the Electrostatic Air Spray Gun Works >

The air hose supplies air to the spray gun. The air atomizes the fluid being sprayed. The Electrostatic controller supplies low voltages to power booster cartridge in the Electrostatic Air Spray guns.

Electricity supplied by the electrostatic controller is converted to high voltage by a cartridge (booster circuit) inside the gun. The high voltage is supplied to tip of the electrode.

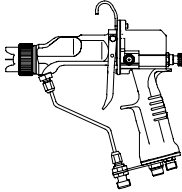
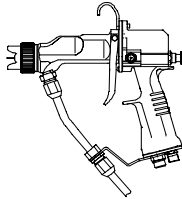




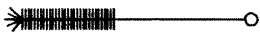

The pump supplies fluid to the hose and gun, where the fluid is electrostatically charged as it passes the electrode.

The charged fluid is attracted to the grounded work piece, wrapping around and evenly coating all surfaces.

2 Check the product

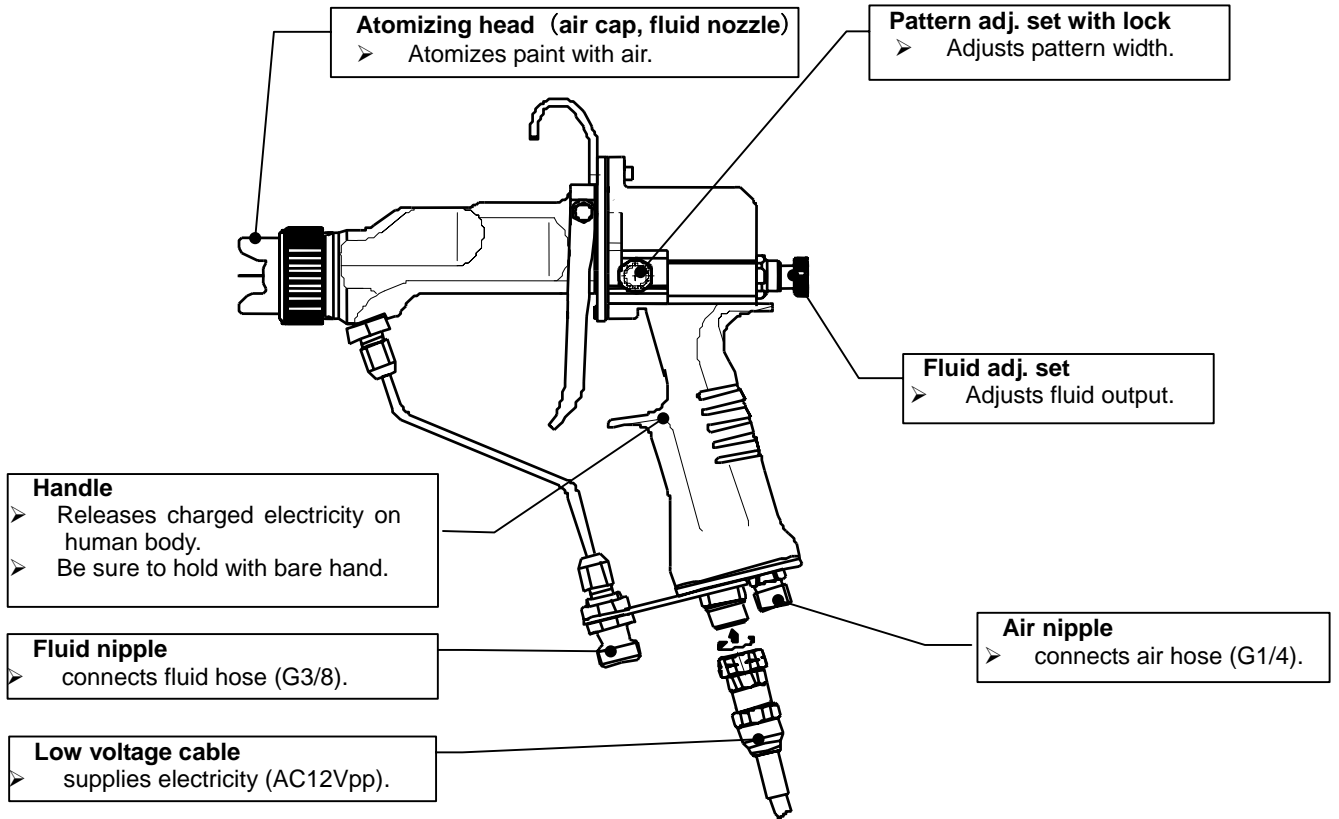
< For Operators and Supervisors >

This product consists of an electrostatic gun including the following accessories. Before use, be sure to confirm that there is no shortage or damage. If there is any shortage or damage, please contact the shop which sold it to you.

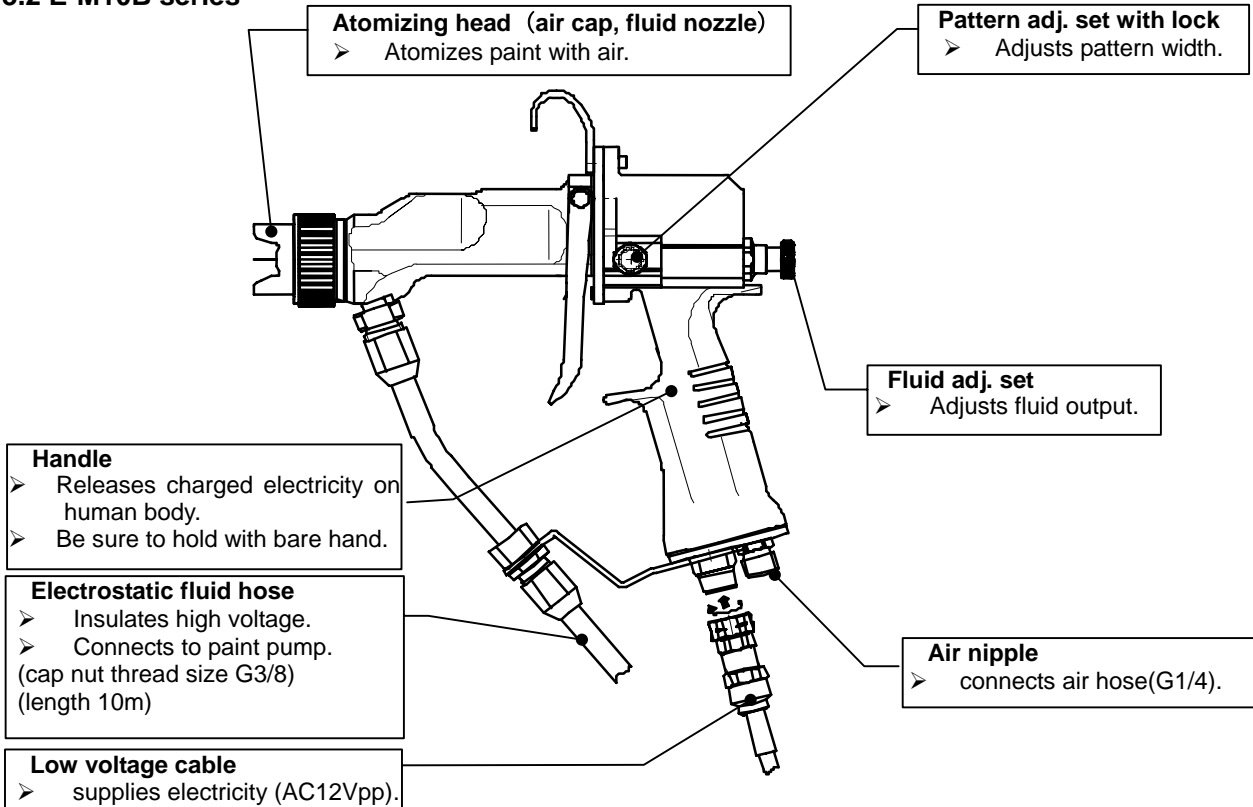
Name of product		E-M15B series	E-M10B series
Electrostatic gun			
Low voltage cable			
Accessories	(1) Special screwdriver to tighten needle packing set		
	(2) Binding tube to bind air hose and low voltage cable		
	(3) Cleaning brush to clean electrostatic gun exclusively (to clean surface)		
	(4) Cleaning brush to clean electrostatic gun exclusively (to clean small holes)		
	(5) Instruction manual (this one)		

3 Names and functions of each section < For Operators and Supervisors >

3.1 E-M15B series



3.2 E-M10B series








4 Connection and setting

< For Supervisors >

4.1 Connection of electrostatic gun

Before connecting electrostatic gun, be sure to read and observe the below chart. In case of E-M15B series refer to “standard connection example of (1) E-M15B series” on page. Refer to “standard connecting example of (2) E-M10B series” on page 8 for E-M10B series gun and then install the gun.

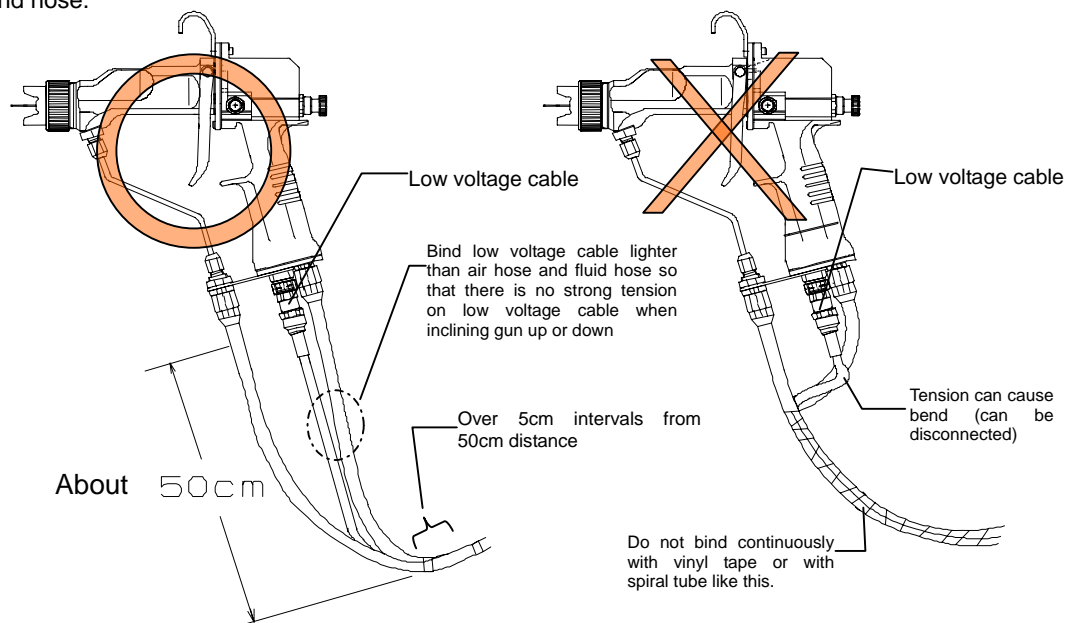
 WARNING	
	Before connection, be sure to turn off primary side electric source, release primary side air source and turn off all electric source switches. (Refer to P.④ "avoidance of wrong operation")
	Be sure to check that all products are grounded. If not done, it can cause fire by spark discharge through leakage or charge and bodily injury by electric shock.
	(1) Be sure to use designated primary side electric source for electrostatic controller (E-SC12-EX series : option). Input of different voltage other than designated one can cause damage to the product or fire (refer to instruction manual of electrostatic controller or multi-gun control system as for details). (2) Max. air pressure of primary side air source must be less than 0.68MPa. If higher, it can cause damage to the product or accident since the product is not for high pressure.
 CAUTION	
(1) Be sure to clean air filtered through air dryer, air filter (3~5 μm) and oil mist separator (0.03~0.01 μm). When using lubricator in air supply piping, take air from separate supply piping or filter through over two-stage oil mist separators. Dirty air for painting can fail painting. (2) When using for the first time after purchase, spray thinner into the inside of fluid passage and remove anti-rust oil. Remaining anti-rust oil can fail painting such as fish eyes. (3) Before connecting air hose to electrostatic gun, fully blow air. Dust in piping can fail painting. (4) Before use, filter paint to remove dust or foreign matter from paint. If not, it can cause leak from seated section and make initial fluid output unstable. (5) Electrically connect electrostatic controller (E-SC12-EX) series : option) and other equipment in accordance with this instruction manual and instruction manuals of other related products. (6) Bind low voltage cable, air hose and fluid hose so that there is no partial tension or bend. Refer to (4.2 "Precautions on installation and handling of low voltage cable" (P.6)	

4.2 Precautions on installation and handling of low voltage cable

Be sure to read and observe the below cautions before connection, installing and handling low voltage cable.

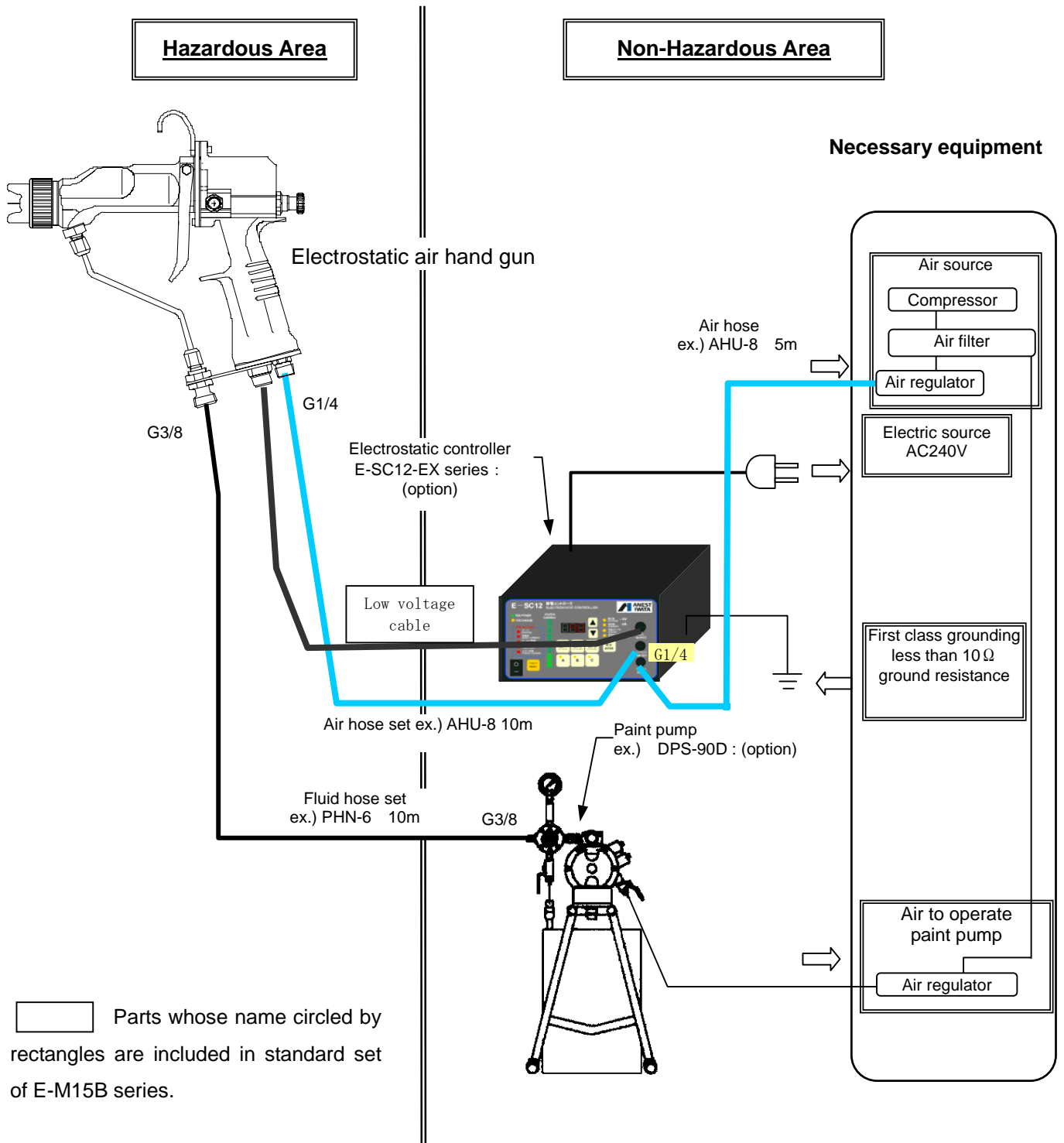
CAUTION

- (1) Tighten cap nut of low voltage cable and securely connect low voltage cable.
If tightening is incomplete, paint and solvent can enter inside of connector causing failure of electrostatic gun and electrostatic controller.
- (2) Be sure to observe the following about binding low voltage cable of electrostatic gun in order to maintain its strength and durability.
 - ① Never bind cable within about 50cm from gun handle of electrostatic gun.
 - ② When pointing electrostatic gun upwards, downwards, left and right, carefully bind low voltage cable with air hose and fluid hose so that there is no strong bend or tension on low voltage cable.
 - ③ When binding over 50cm from gun handle, bind with attached spiral tube or vinyl tape at over 5cm intervals, and do not bind too tightly. Especially do not bind continuously with vinyl tape or wide spiral tube. If done, bound section becomes like a hard bar, and it is broken at both ends, then it can cause disconnection or damage of cable and hose.

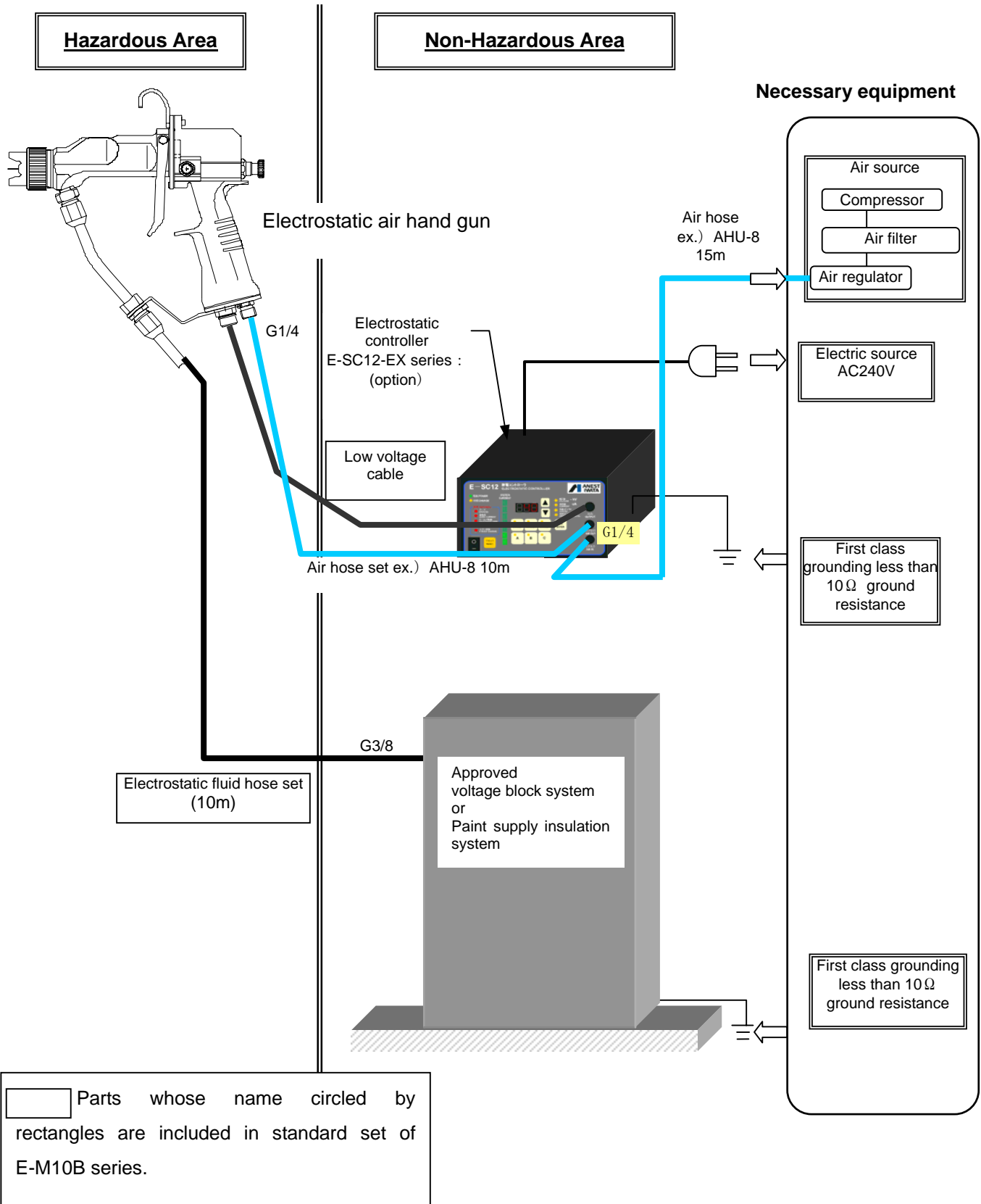


- (3) Do not bind low voltage cable, air hose or fluid hose, or handle electrostatic gun so that there is forced bend or strong tension during painting.. If done, it can reduce strength and cause disconnection.
- (4) Pay attention not to trample on low voltage cable. It can disconnect when you trample on it especially on grid floor of the spray booth.
- (5) Do not continuously bind low voltage cable itself (especially near electrostatic gun connector) with vinyl tape etc., to increase strength or avoid dirt. If done, it can conversely reduce strength and cause disconnection.
- (6) Do not immerse low voltage cable in solvent or paint for a long time. If done, it can greatly reduce strength and lifetime of low voltage cable.
- (7) After cleaning low voltage cable, be sure to remove solvent attached to surface, or blow with air.
- (8) Do not use metallic binding band. Metallic one can accumulate static electricity and cause electric shock.

(1) Standard connecting example of E-M15B series spray gun



(2) Standard connecting example of E-M10B series gun



4.3 Check grounding

< For Operators and Supervisors >

Job-1 Ground all conductive objects within 3 m from electrostatic hand gun.

⚠ WARNING

Ground all conductive objects within 3m from electrostatic gun to avoid electrostatic electric accidents (electric shock and fire).

Job-2 Turn on electric source of electrostatic controller (E-SC12-EX series : option) and check that ground failure does not display. (Regarding turning on electric source and failure display, refer to instruction manual of electrostatic controller).

4.4 Setting spray conditions

< For Supervisors >

(1) Air pressure

Adjust air regulator

(2) Fluid output / pattern width

Adjust fluid output by fluid pressure adjustment and locked fluid adj. knob and adjust pattern width by pattern adj. set.

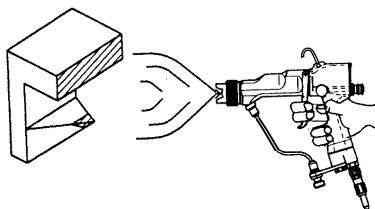
(3) Check spray distance

Set spray distance at about 200~300mm in order to get proper electrostatic effect.

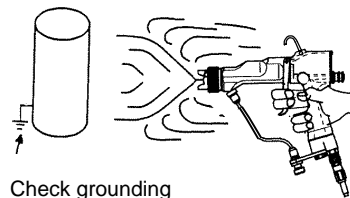


Hints about electrostatic painting

Bad penetration into recessed section and paint buildup on protruded section



Too much bounce back





Spray pressure	Increase
Spray distance	Closer
Pattern width	Smaller
Voltage	Decrease
Spraying	Spray recessed section first

Spray pressure	Increase
Spray distance	Closer
Pattern width	Smaller
Voltage	Decrease
Spraying	Spray recessed section first

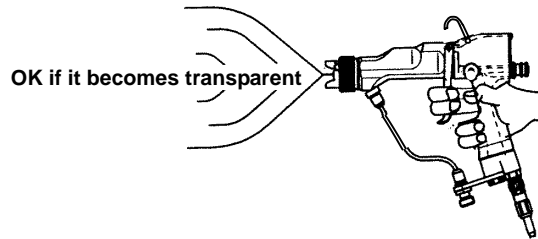
4.5 Cleaning after painting job is finished

< For Operators and Supervisors >

	<h3>WARNING</h3>
	<p>(1)After painting job is finished, be sure to fully release air pressure and fluid pressure and turn off electrostatic controller (E-SC12-EX series : option)</p> <p>(2)Before cleaning fluid passage (spraying thinner), be sure to turn off electrostatic controller (E-SC12-EX series : option). If not, it can cause ignition and great danger</p>

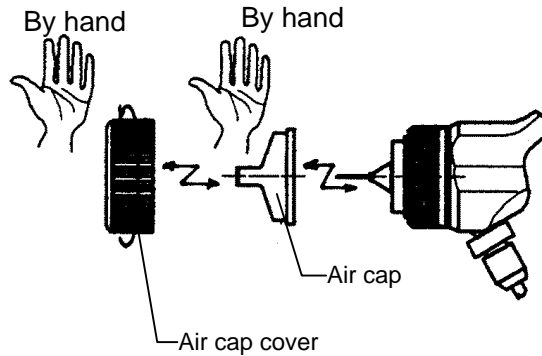
Job-1 Clean fluid passage (spray thinner)

Spray till cleaning thinner becomes transparent.



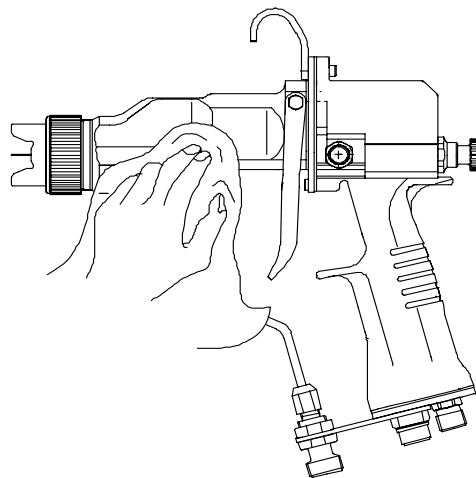
Job-2 Clean atomizing head

Remove and clean air cap cover and air cap (As for details, refer to 6. "Disassembly and assembly" on page 17)



Job-3 Clean electrostatic air hand gun and low voltage cable

In order to use electrostatic gun for a long time, wipe off surface of electrostatic gun and low voltage cable with soft cloth soaked with cleaning thinner and cleaning brush (to clean surface). After cleaning is finished, be sure to blow surface of gun and low voltage cable with air and dry up attached thinner.

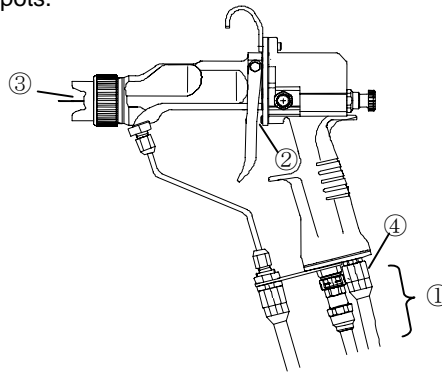


 **CAUTION**

(1) When the situation forces you to clean electrostatic gun with thinner gun, be sure to observe the following. If not, it can fail electrostatic gun.

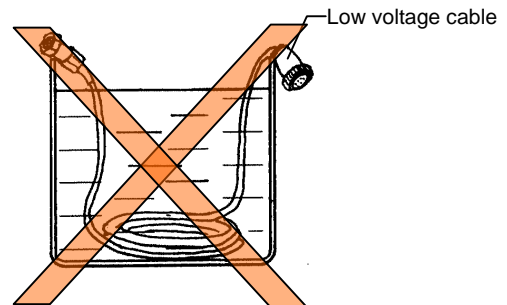
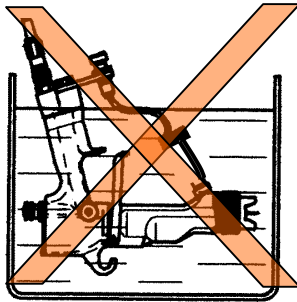
- a) After cleaning with thinner gun, be sure to blow with air and dry up thinner attached to surface of electrostatic gun and low voltage cable. As thinner can enter air passage of electrostatic gun during cleaning with thinner gun, be sure to spray air through electrostatic gun (dry air) and blow remaining thinner out.
- b) Do not spray thinner gun for a long time. Especially do not focus on one spot.
- c) Do not spray thinner gun directly to the following spots.

- ① Connector of low voltage cable
- ② Nail of trigger
- ③ Air hole of air cap
- ④ Inside of air nipple



(2) What you must never do



Never immerse electrostatic gun body or low voltage cable in cleaning thinner. If done, thinner can enter air passage and high voltage generator in gun, failing electrostatic gun and electrostatic controller or disconnecting low voltage cable for a short time due to its deterioration.



5 Inspection and maintenance

< For Supervisors >

- Only the supervisors and / or other equally qualified personnel, having fully read and understood the contents of this instruction manual, can take care of matters related to Chapters 5.
- Be sure to observe the following inspection standards to achieve functions safely and fully.

 WARNING
Before inspection and maintenance, be sure to turn off electric source of electrostatic controller (E-SC12-EX) series : option) and fully release air pressure and fluid pressure. (Refer to P.④ "avoidance of wrong operation").
 CAUTION
Never immerse electrostatic gun or low voltage cable in cleaning thinner. Clean them in accordance with 4.5 "Job-3 Clean electrostatic gun and low voltage cable" (P.10, 11). If not, it can affect safety and performance of the products.

5.1 Daily inspection and maintenance

1) Daily inspection items

No	Part name	Where to inspect	Contents	Purpose	Remedies
1	Fluid needle	Tip pin electrode	Visually check for bend or breakage	Avoid painting failure and low transfer efficiency	Replace part
2	Fluid nozzle	Tip section	Visually check deformation and damage	Avoid painting failure	Replace part
3	Air cap	Center and horn holes	Visually check deformation and damage	Avoid painting failure	Replace part
4	Electrostatic gun	Each section	Check for air leakage (by leaking sound)	Avoid painting failure, electrostatic accident by failing to stop charge	Refer to 8.1 "Problems and remedies" (P.26)
5	Fluid nozzle	Tip section	Visually check for fluid leakage from tip of fluid nozzle	Avoid painting failure	Refer to 8.1 "Problems and remedies" (P.26)
6	Electrostatic controller	Charge lamp	Visually check if charge lamp lights up and gun is charged	Avoids painting failure and low transfer efficiency	Refer to 8.2 "Problems and remedies" (P.27)
		Display lamp of electric current figure for painting	Visually check if current figure exceeds normal figure.	Avoids painting failure and low transfer efficiency	Refer to [Clean fluid passage of gun in 5.1 2] "daily inspection No.1" (P.12).
7	Low voltage cable	The whole cable	Visually check for excessive strain on low voltage cable	Avoid output failure, electric shock or fire due to disconnection of low voltage cable	Refer to 4.1 "Low voltage cable installation" (P.6).

2) Daily inspection items

	Part name	Where to inspect	Contents	Purpose
1	Electrostatic gun	Fluid passage	Clean fluid passage of gun with thinner	Avoids painting failure and low transfer efficiency due to electric leakage from paint buildup
2	Electrostatic gun	Surface	Remove paint attached to surface	Avoids low transfer efficiency due to electric leakage
3	Low voltage cable	Surface	Remove paint attached to surface	Avoids short cable lifetime
4	Fluid hose/air hose	Surface	Remove paint attached to surface	Avoids short hose lifetime

5.2 Periodical inspection items

1) Weekly periodical inspection (appearance) (*handle : handle, barrel tip body of gun [plastic])

No	Part name	Where to inspect	Contents	Standards	How to inspect	Purpose	Remedies
1	Electro-static gun	connection between handle* and barrel*	Check for clearance	No clearance	Visually check	Avoids failure of electric parts in gun and electrostatic controller due to paint and thinner inside.	Contact the shop which sold it to you and ask for repair.
2	Low voltage cable	connection between electro-static gun and local connector	Check for looseness	No looseness	Tighten and check	Avoids failure of electrostatic controller	Tighten low voltage cable nut. Refer to 6.4 「Remove and fit low voltage cable」 (P.23).
3		outer cover of cable	Check for crack or swelling.	None	Visually check	Avoids failure of output and electric shock or fire due to disconnection of cable	Replace low voltage cable. Refer to 6.4 「Remove and fit low voltage cable」 (P.23).
4	Electro-static controller	OCR lamp	Check if OCR operates	OCR must operate	Under charged condition, bring tip of gun close to grounded metal.	Checks function of safeguard.	Contact the shop which sold it to you and ask for repair.

2) Periodical inspection (inspect electrostatic gun and cable individually)

No	Part name	Cycle	Where to inspect	Contents	Purpose	Remedies
1	Low voltage cable	500Hr	Conductivity and isolation of each section	Check as per 5.4 "Periodical inspection" 1) (P.14)	Avoids electric shock and fire due to disconnection of cable	Replace low voltage cable Refer to 6.3 「Remove and fit low voltage cable」 (P.22)
2	Gun body	500Hr	Conductivity and isolation of each section	Check as per 5.4 "Periodical inspection" 2) (P.15)	Maintain performance of gun	Contact the shop which sold it to you and ask for repair.
3	Electro-static controller	1000Hr	Check for output	Check as per 5.4 "Periodical inspection" 3) (P.16)	Maintain performance of electrostatic controller	Contact the shop which sold it to you and ask for repair.

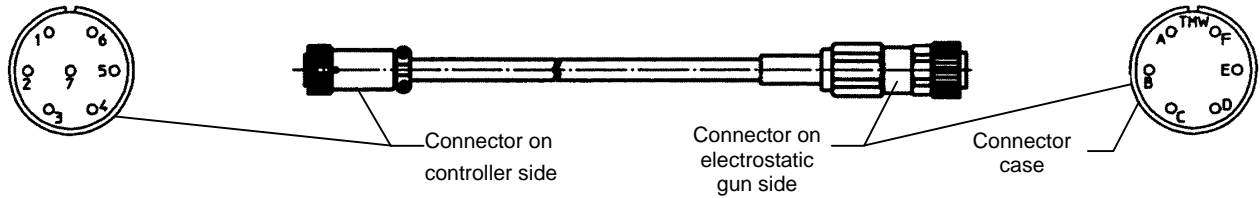
5.3 Periodical parts replacement (when parts are used without damage)

No	Part name	Replacement cycle	If not done	Remarks
1	Needle packing set	1000Hr	Paint leakage	
2	Bar set	700Hr	Paint leakage	
3	Fluid needle set	1000Hr	Paint leakage	
4	Air valve set	2000Hr	Air leakage	(check at 1000Hr)
5	Fluid nozzle	2000Hr	Paint leakage	(check at 1000Hr)
6	Low voltage cable	500Hr	Charge failure, electric shock, fire	(check at 500Hr)
7	Needle packing set	1000Hr	Paint leakage	

Regarding maintenance inside electrostatic gun which is not described in instruction manual, contact the shop which sold it to you since it can fail safety factor and performance.

5.4 Periodical inspection method

1) Inspect conductivity and isolation of low voltage cable



① Conductivity inspection

Where to inspect conductivity

Inspection No.	Connector terminal No. on controller side	Connector terminal No. on electrostatic gun side	Normal condition
1	1	A	Must be conductive by tester
2	2	F	
3	3	E	
4	4	D	
5	5	C	
6	7	Connector case	

② Isolation inspection

Where to inspect isolation

Inspection No.	Connector terminal No. on controller side	Connector terminal No. on electrostatic gun	Normal figure
1	1	F, E, D, C	Over 1000M Ω by insulation resistance tester (500V) ^{*1)}
2	2	E, D, C	
3	3	D, C	
4	4	C	
5	7	A, F, E, D, C	

*1) You can use 1000V insulation resistance tester.

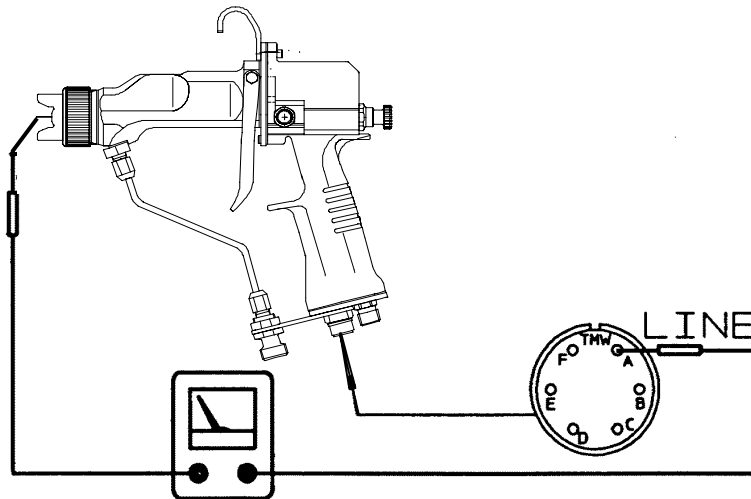
2) Conductivity and isolation of electrostatic gun body

① Measure resistance between electrode at gun tip and connector terminal A on gun side

◎ Normal resistance = In the range of 180~280MΩ

◎ Measuring condition : Measured by insulation resistance tester (500V^{*1})

*1) You can use 1000V insulation resistance tester.



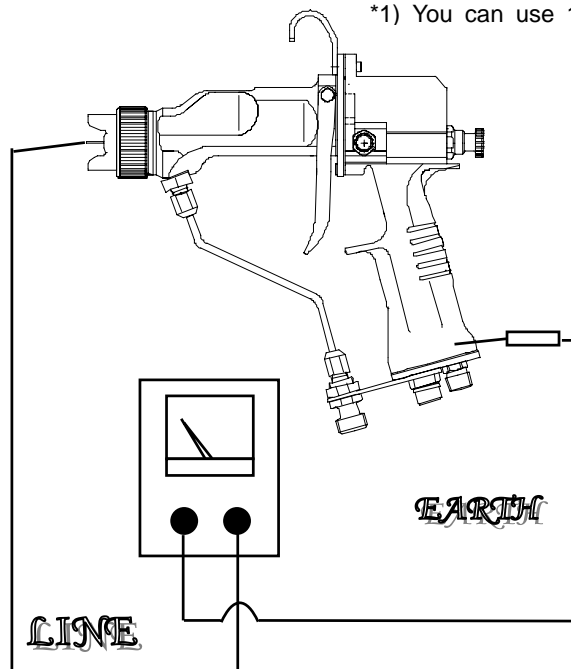
Normal resistance 180~280MΩ

② Measure resistance between electrode at gun tip and handle

◎ Normal resistance = Over 2000MΩ

◎ Measuring condition: Measured by insulation resistance tester (500V^{*1})

*1) You can use 1000V insulation resistance tester.



Normal resistance over 2000MΩ

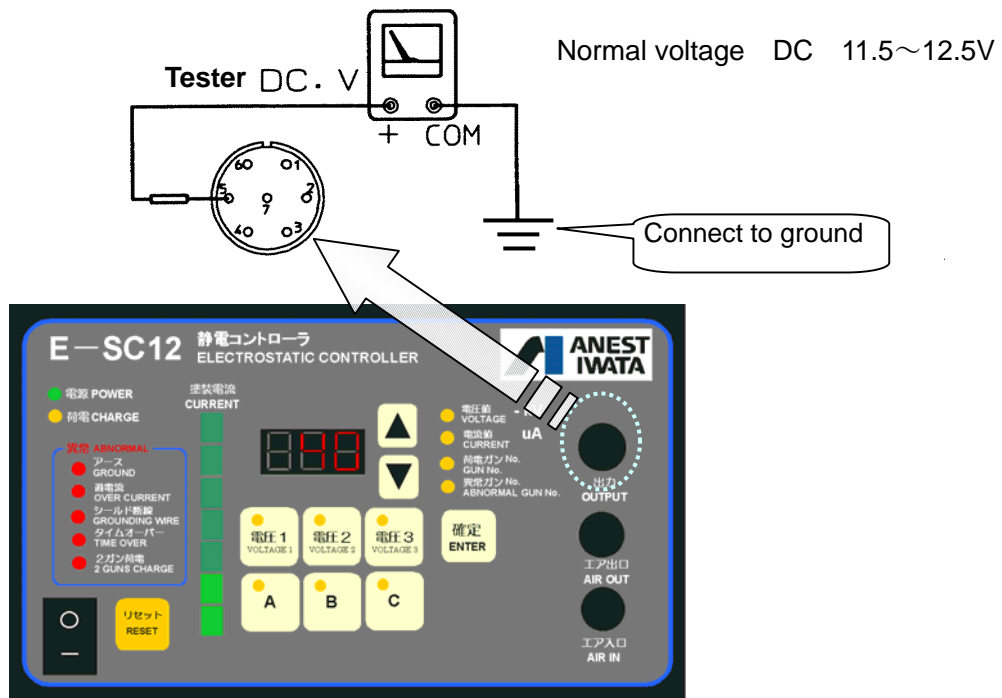
3) Inspect output of electrostatic controller (E-SC12-EX series)

CAUTION

- (1) Never contact No.5 terminal (pin), connector case or other terminal with test bar of tester. If done, it can damage circuit since excessive current flows in electrostatic controller.
- (2) Pay attention to the range of tester. If not, it can damage tester and electrostatic controller.

① Measure output voltage between electrostatic controller connector No. 5 terminal and electrostatic controller ground terminal

- ◎ Normal voltage = In the range of DC 11.5 ~ 12.5V
- ◎ Measuring condition : Set voltage at -40kV(MAX), remove low voltage cable from electrostatic controller, keep electric source of electrostatic controller ON and then measure use tester to measure voltage.



6 Disassembling and assembling

< For Supervisors >

- Only the supervisors and / or other equally qualified personnel, having fully read and understood the contents of this instruction manual, can take care of matters related to Chapters 6.



WARNING

Before disassembling, be sure to turn off electric source of electrostatic controller (E-SC12-EX) series: option) , and fully release air pressure and fluid pressure.



CAUTION

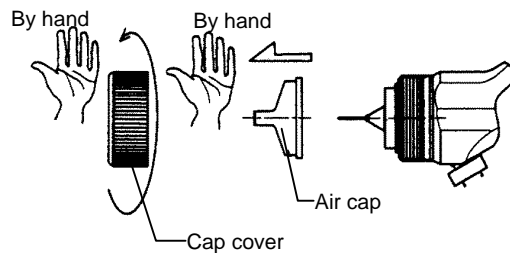
Precautions when disassembling and assembling electrostatic gun

- (1) First fully remove attached dust on each part before assembling.
- (2) After assembling, be sure to check that there is no leakage of air or fluid.
- (3) Over-tightening air cap, fluid nozzle and plastic screw at gun tip can damage screw or seated section. Pay attention not to tighten with more than necessary strength.
- (4) Be sure to fit or remove fluid nozzle while pulling trigger. If not, it can damage seat of set.

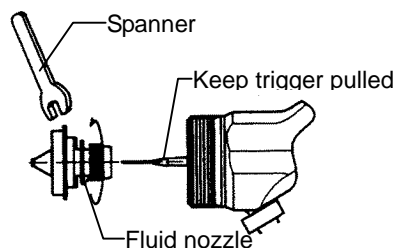
6.1 How to replace fluid needle set and fluid needle packing

(1) Remove air cap and fluid nozzle

Job-1 Manually turn air cap cover and remove air cap cover and air cap.

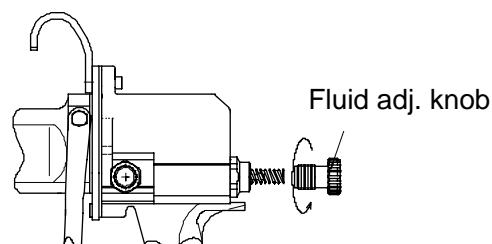


Job-2 Apply monkey wrench to hex. Surface of fluid nozzle while pulling trigger, and loosen screw and remove.

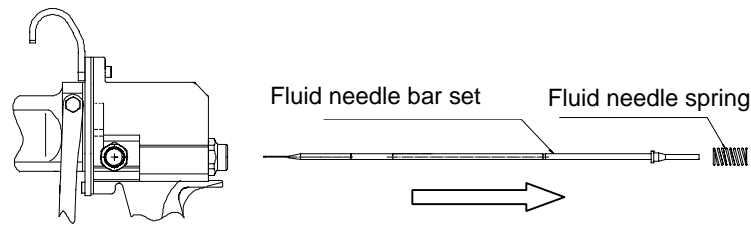


(2) Remove fluid needle bar



Job-1 Remove locked fluid adj. knob.



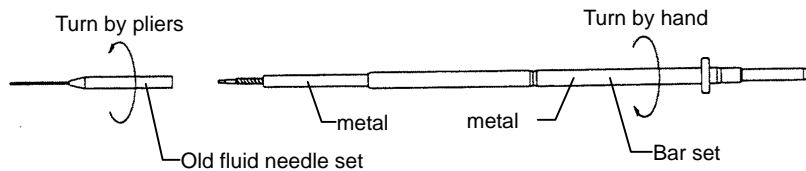
Job-2 Pull out fluid needle spring and fluid needle bar set.



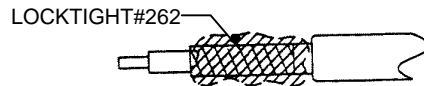
(3) Replace fluid needle set

 WARNING
Pay full attention when using knife to replace fluid needle set (Job-2).
 CAUTION
(1) Replace fluid needle set only when it is worn out or damaged. Never use it once it is removed. (2) When removing it, pay attention not to damage metallic section shown below with cutting pliers. If done, it can cause fluid leakage or operation failure.

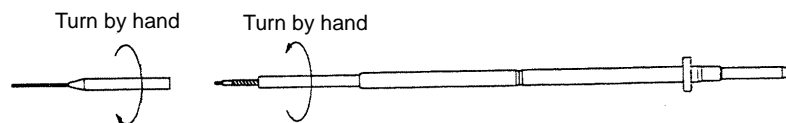
Job-1 Grab fluid needle with cutting pliers and turn it.



Job-2 Fully remove old adhesive remaining in thread of bar set with knife or dies of M2×0.4 size, and apply LOCKTIGHT#262 to thread.

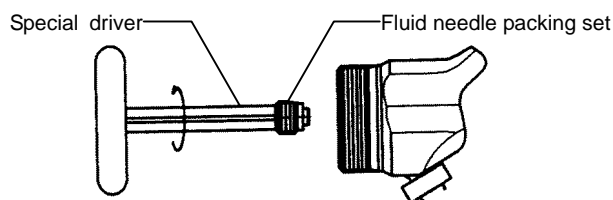


Job-3 Screw new fluid needle fully to the end without any clearance but do not overtighten it. Wipe off protruded adhesive with soft cloth soon.



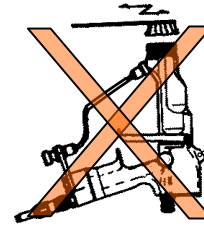
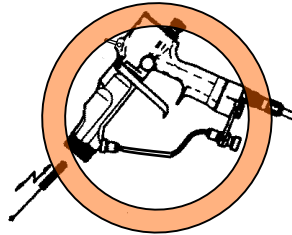
(4) Replace fluid needle packing set.

Job-1 Fully loosen fluid needle packing set with attached special screwdriver and remove it.

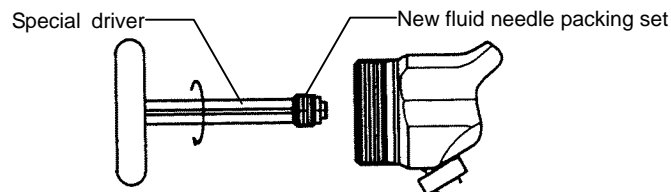


Job-2 Point gun downwards, clean inside of barrel, and blow solvent with air.

Cleaning barrel with its head pointing upwards can make dirty thinner enter air passage, failing air valve and fluid needle.

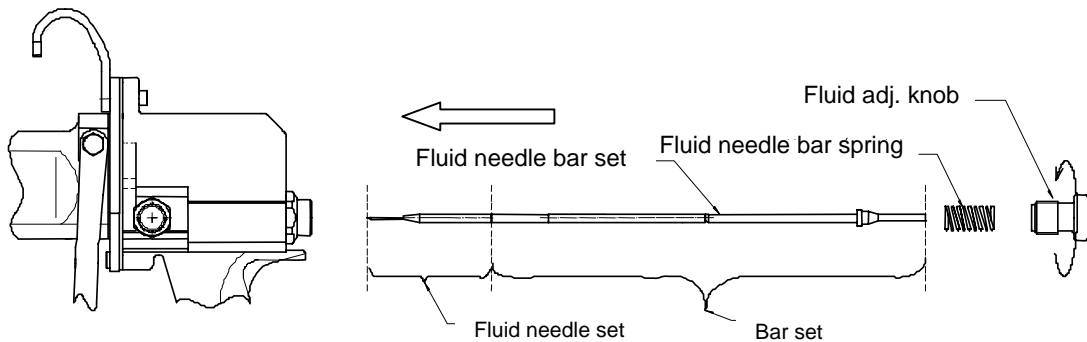


Job-3 Screw lightly new fluid needle packing set with special screwdriver.

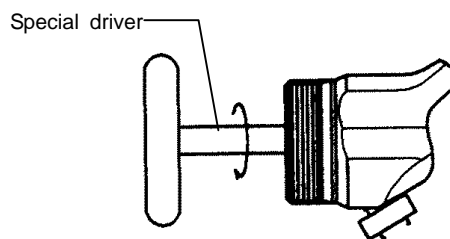


(5) Fit fluid needle bar set

Job-1 Insert fluid needle bar set from rear section of gun and fit fluid needle spring and fluid adj. knob.

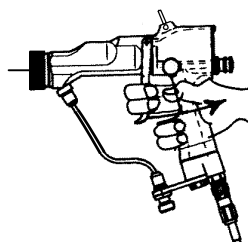


Job-2 Screw lightly fluid needle packing set with special screwdriver and tighten further by about 30° after screw stops.

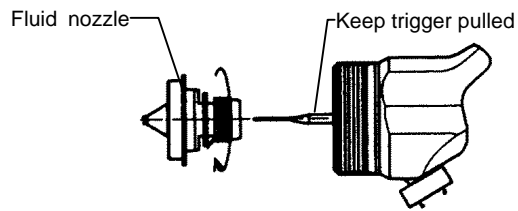


(6) Fit fluid nozzle


Job-1 Pull trigger (Keep on pulling trigger till **job-3** is finished)

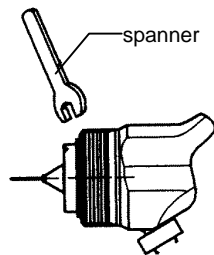


Job-2 Lightly screw fluid nozzle by hand.



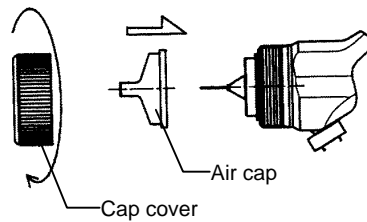
Job-3 Tighten further about 10° ~ 20° after fluid nozzle is stopped by hand tightening.

	<h2>CAUTION</h2>
<p>Be sure to observe the above 10° ~ 20° tightening. Further additional tightening can damage plastic screw or seated section.</p>	

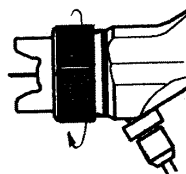


(7) Fit air cap

Job-1 Fit air cap to air cap cover and lightly screw air cap cover into gun body.



Job-2 Adjust cap direction and tighten cap cover. Further tighten about 20° after it is stopped by hand tightening. (Tighten air cap to the extent that air cap does not turn)

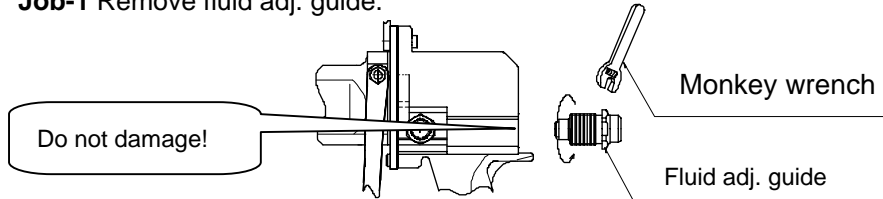


6.2 How to replace air valve seat set and fluid adj. guide

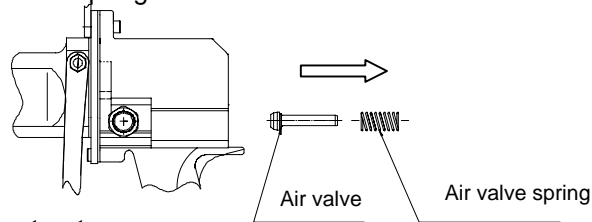
(1) Remove air cap cover, air cap, fluid nozzle and fluid needle bar set in accordance with 6.1 (1)~(2).

(2) Remove fluid adj. guide, spacer, air valve spring and air valve.

Job-1 Remove fluid adj. guide.

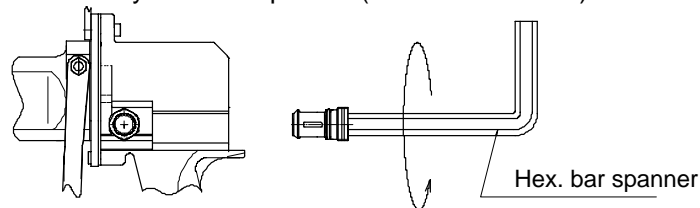


Job-2 Remove air valve spring and air valve.

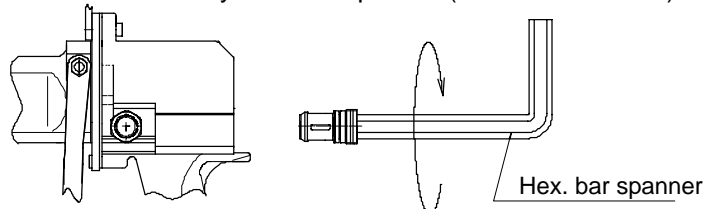


(3) Replace air valve seat set

Job-1 Remove air valve seat by hex. bar spanner (wrench flat 10mm).



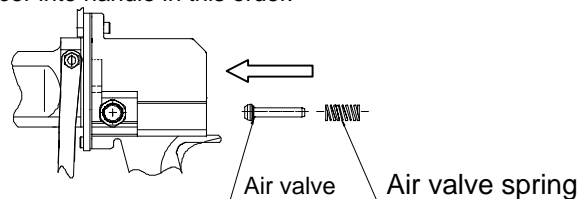
Job-2 Tighten new air valve seat set by hex. bar spanner (wrench flat 10mm).



(4) Fit air valve, air valve spring, spacer and fluid adj. guide.

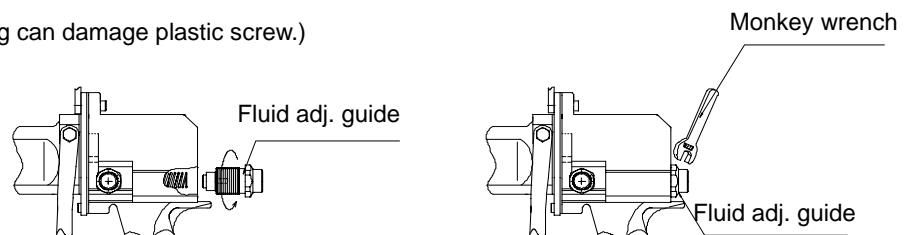
Job-1 Fit air valve, air valve spring and spacer into handle in this order.

Hint
Job becomes easier if you point gun downwards.



Job-2 Insert convex at tip of fluid adj. guide into concave of air valve spring and screw fluid adj. guide. (*Further additional tightening can damage plastic screw.)

Hint
Job becomes easier if you point gun downwards.



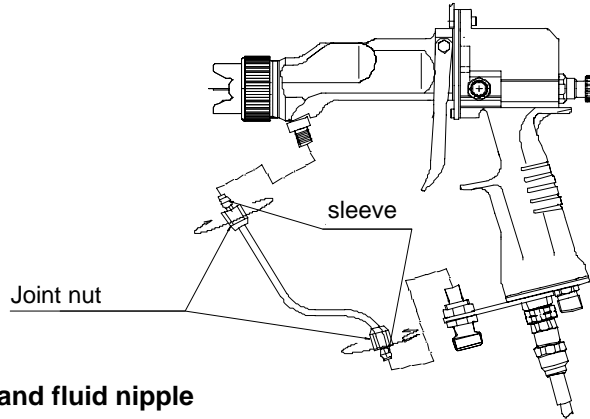
(5) Fit needle bar set, fluid nozzle and air cap in accordance with 6.1 (5)~(7).

6.3 How to replace fluid tube set

<In case of E-M15B series>

(1) Replace fluid tube set

Remove joint nuts (2 places) and then fluid tube set.



(2) Clean fluid joint and fluid nipple

Wipe off paint stuck on fluid joint and fluid nipple by attached cleaning brush.

(3) Fit fluid tube set

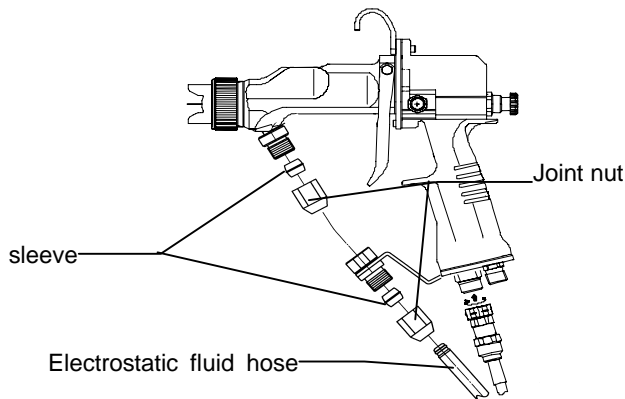
Fit joint nut and sleeve to fluid tube set, fit it to gun, tighten joint nut and fix fluid tube set.

<In case of E-M10B series>

(1) Remove fluid hose set.

Remove joint nuts (2 places) and then electrostatic fluid hose set.

*When joint nut becomes too tight and sleeve has deformed, you often cannot pull out electrostatic fluid hose. In that case, refer to the below and right figures, cut tip of electrostatic fluid hose and then pull out the fluid hose.

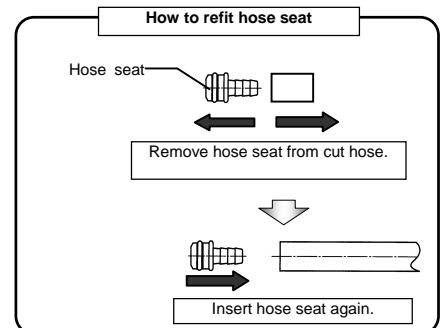
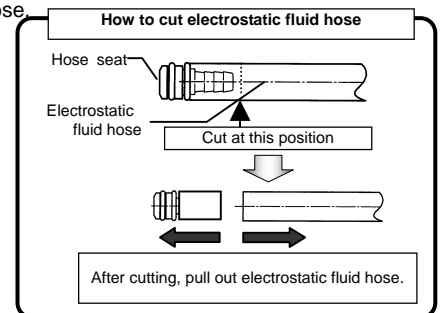


(2) Clean fluid joint

Wipe off paint stuck on fluid joint with attached cleaning brush.

(3) Fit electrostatic fluid hose set.

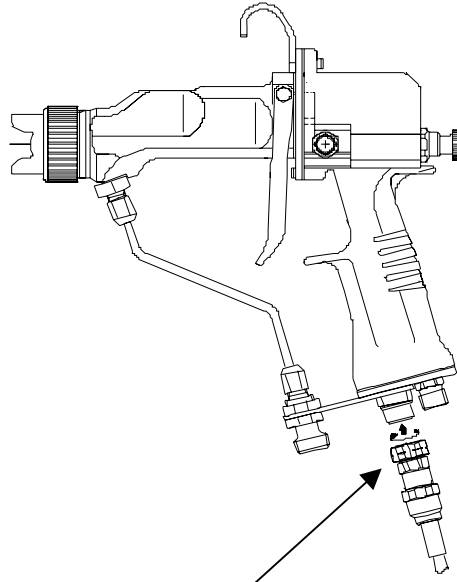
Fit joint nut and sleeve to electrostatic fluid hose, fit it to gun, tighten joint nut and fix electrostatic fluid hose set.



6.4 Fit or remove low voltage cable

 **CAUTION**

- (1) Do not remove low voltage cable so often except when replacing or inspecting low voltage cable.
- (2) Turn cap nut of low voltage cable in order to fit or remove low voltage cable (loosen / tighten). Loose tightening of cap nut can make paint and solvent enter connector, failing electrostatic gun and electrostatic controller.



Cap nut to fix low voltage cable

7 Parts list

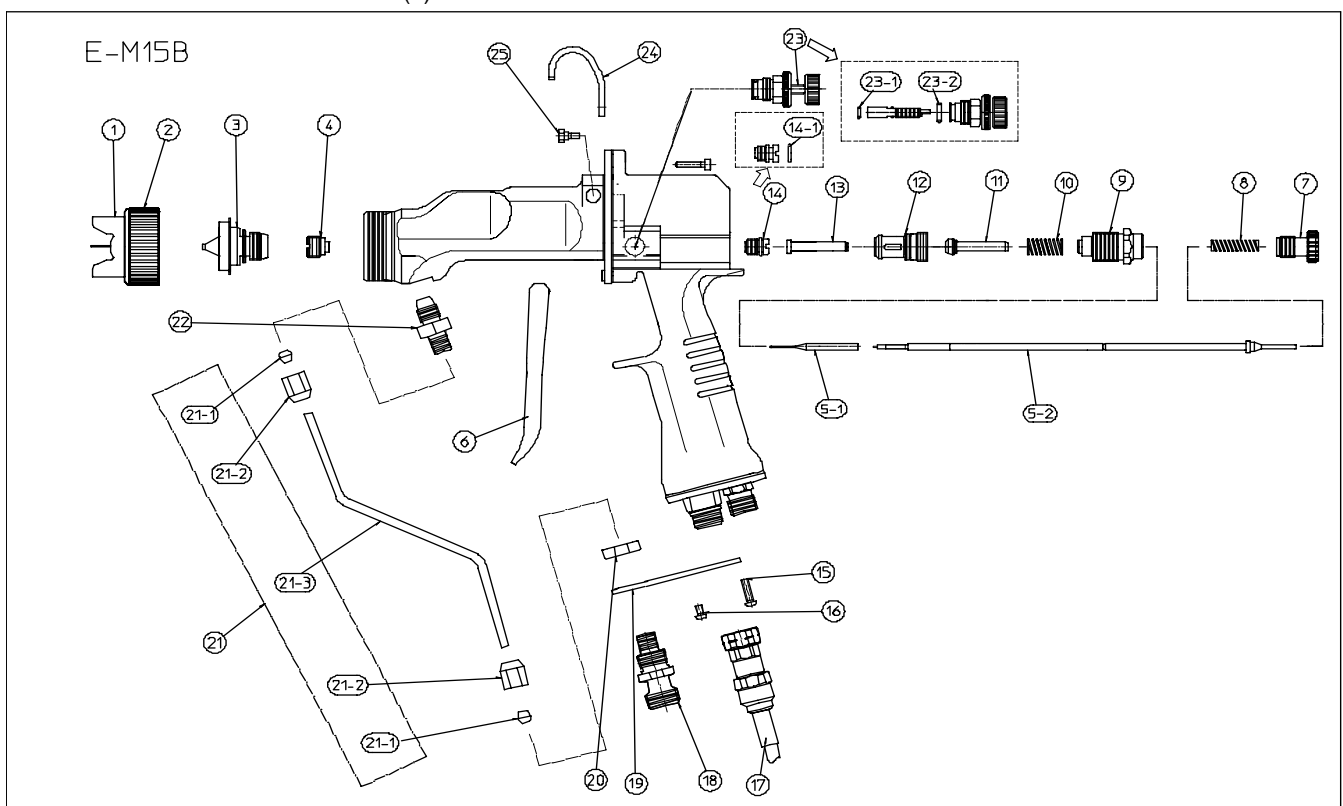
< For Supervisors >

7.1 E-M15B series

No.	Part name	Q'ty	No.	Part name	Q'ty
1	Air cap ^{*1)}	1	15	Screw	2
2	Cap cover	1	16	Screw	2
3	Fluid nozzle ^{*2)}	1	17	Low voltage cable ^{*3)}	1
4	Needle packing set	1	18	Fluid nipple	1
5-1	Fluid needle set	1	19	Fluid joint stay	1
5-2	Bar set	1	20	Fixed nut	1
6	Trigger	1	21	Fluid tube set	1
7	Fluid adj. knob	1	21-1	Sleeve	2
8	Needle spring	1	21-2	Joint nut	2
9	Fluid adj. guide set	1	21-3	Fluid tube	1
10	Air valve spring	1	22	Fluid joint	1
11	Air valve	1	23	Pattern adj. set	1
12	Air valve seat set	1	23-1	O ring	1
13	Air valve bar	1	23-2	O ring	1
14	Bar packing set	1	24	Hook	1
14-1	O ring	1	25	Trigger screw	2

*1) Part name differs according to model name as follows: (□ : blank) *3) Part name differs according to model name as follows
 E-M15B-13C1□ : air cap(2)、 E-M15B-13C2□ : air cap(3)
 E-M15B-13L1□ : air cap(1)

*2) Part name differs according to model name as follows: (□ : blank) ESGX-121C series are used for special customer.
 E-M15B-13C1□、 E-M15B-13C2□ : fluid nozzle(2)、 As for ESGX-121C series, composition changes with option codes.
 E-M15B-13L1□ : fluid nozzle(1)



7.2 E-M10B series

No.	Part name	Q'ty	No.	Part name	Q'ty
1	Air cap ^{*1)}	1	17	Low voltage cable	1
2	Cap cover	1	18	L stay	1
3	Fluid nozzle ^{*2)}	1	19	Intermediate holder	1
4	Needle packing set	1	20	Fixed nut	1
5-1	Fluid needle set	1	21	Electrostatic fluid hose set	1
5-2	Bar set	1	21-1	Hose seat set	1
6	Trigger	1	21-2	Joint nut	2
7	Fluid adj. knob	1	21-3	Sleeve	2
8	Needle spring	1	21-4	O ring	1
9	Fluid adj. guide set	1	21-5	O ring	1
10	Air valve spring	1	21-6	Sleeve	1
11	Air valve	1	22	Fluid joint	1
12	Air valve seat set	1	23	Pattern adj. set	1
13	Air valve bar	1	23-1	O ring	1
14	Bar packing set	1	23-2	O ring	1
14-1	O ring	1	24	Hook	1
15	Screw	2	25	Trigger screw	2
16	Screw	2			

*1) Part name differs according to model name as follows: (□ : blank)

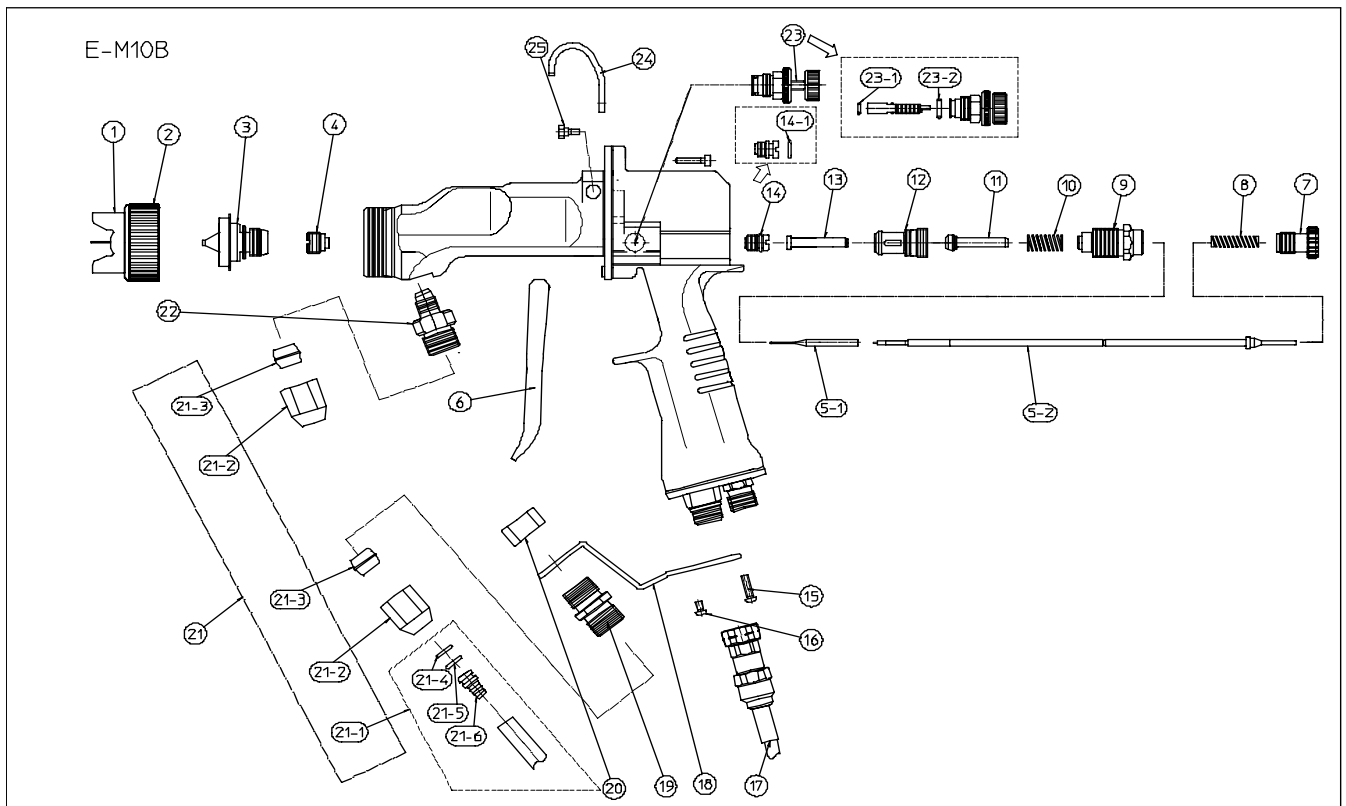
E-M10B-13C1□ : air cap(2)、 E-M10B-13C2□ : air cap(3)

E-M10B-13L1□ : air cap(1)

*2) Part name differs according to model name as follows: (□ : blank)

E-M10B-13C1□、 E-M10B-13C2□ : fluid nozzle(2)、

E-M10B13L1□ : fluid nozzle(1)



8 Problems and remedies (Troubleshooting)

< For Supervisors >

- Check all troubleshooting solutions before disassembling gun. Some problems result from improper balance of air and fluid.
- When you cannot solve problem even if you consult the following, contact the shop which sold it to you.

8.1 Painting equipment

Problem	Place	Place(s) to be checked	Part No.	Cause Check · Confirm	Tighten	Repair	Adjust	Clean	Replace	
					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Air leakage	Joint	Each air joint		Insufficient tightening	<input type="checkbox"/>					
				Scratches on seat					<input type="checkbox"/>	
	Tip of electro-static gun	Air valve, Air valve seat set	11 12	Dirt on seat				<input type="checkbox"/>		
				Scratches on seat					<input type="checkbox"/>	
				Weak spring					<input type="checkbox"/>	
			Can not move				<input type="checkbox"/>			
			Damaged					<input type="checkbox"/>		
Fluid leakage	Joint	Each fluid joint		Insufficient tightening	<input type="checkbox"/>					
				Scratches on seat					<input type="checkbox"/>	
	Screw of air cap cover	Fluid nozzle and seat of gun body	3	Insufficient tightening	<input type="checkbox"/>					
				Dirt on seat				<input type="checkbox"/>		
				Scratches on seat					<input type="checkbox"/>	
	Tip of fluid nozzle	Fluid needle set, Fluid nozzle	5-1 3	Dirt on seat				<input type="checkbox"/>		
				Scratches and wear on seat					<input type="checkbox"/>	
		Gun air passage	Fluid adj. set	7	Back flow of thinner		<input type="checkbox"/>			
					Open too wide			<input type="checkbox"/>		
	From lower side of barrel	Needle packing set Bar set	4 5-2	Spring failure					<input type="checkbox"/>	
Insufficient tightening				<input type="checkbox"/>						
			Scratches, wear					<input type="checkbox"/>		
Paint output is decreased or unstable	Paint supply	Fluid pressure		Set pressure is low			<input type="checkbox"/>			
				Fluid regulator fails		<input type="checkbox"/>			<input type="checkbox"/>	
				Leakage from tank	<input type="checkbox"/>					
		Spiral /Straight tube	21	Smashed, bent		<input type="checkbox"/>			<input type="checkbox"/>	
				Clogged				<input type="checkbox"/>	<input type="checkbox"/>	
		Leakage from each fluid joint			Insufficient tightening	<input type="checkbox"/>				
	Dirt on seat							<input type="checkbox"/>		
	Scratches on seat								<input type="checkbox"/>	
	Electrostatic gun	Travel of fluid needle	7 5-1	Fluid adj. knob			<input type="checkbox"/>			
				Fluid needle is loose	<input type="checkbox"/>					
		Fluid nozzle	3	Clogged				<input type="checkbox"/>		
		Air cap	1	Loose	<input type="checkbox"/>					
	Paint	Paint viscosity		Orifice is clogged				<input type="checkbox"/>		
Too high						<input type="checkbox"/>				
	Paint remained		Paint shortage			<input type="checkbox"/>				

Problem	Place	Place(s) to be checked	Part No.	Cause Check · Confirm	Tighten	Repair	Adjust	Clean	Replace
Inferior pattern	Pin electrode	Pin electrode	5-1	Bent, broken,		○			○
	Fluttering	Fluid nozzle	3	Air is mixed	○			○	
		Needle packing set	4	Insufficient tightening	○				
	Crescent	Air cap	1	Hole is clogged or deformed				○	○
	Inclined	Air cap	1	Hole is clogged or				○	○
		Fluid nozzle	3	Deformed					
	Splitting	Fluid viscosity		Too low			○		
	Heavy center	Fluid viscosity		Too high			○		○
	Spitting	Fluid nozzle	3	Seat fails				○	○
		Fluid needle set	5-1	Paint leaks				○	○

8.2 Electrical problems

Problem	Place	Place(s) to be checked	Cause Check · Confirm	Adjust	Clean	Replace	special spec.
High voltage is not charged	Electrostatic gun	Low voltage cable	Connector is not connected	○			
		Barrel	Inside is dirty		○		
	Paint	Paint resistance	less than 30M Ω · cm	○			○
	E-SC12-EX) or E-MC12 electrostatic controller	Refer to Electrostatic controller instruction manual.					

8.3 Check and remedy painting problems

Problem	Place	Place(s) to be checked	Part No.		Cause Check · Confirm	Adjust	Clean	Replace
Inferior finish	Poor atomization	Spray air pressure			Too low	<input type="radio"/>		
		Paint viscosity			Too high	<input type="radio"/>		
		Air cap set Fluid nozzle	1 3		Clogged, dirty, damaged		<input type="radio"/>	<input type="radio"/>
	Orange peel	Spray air pressure			Low	<input type="radio"/>		
		Fluid viscosity			High	<input type="radio"/>		
	Haze · blushing	Solvent boiling point			Low	<input type="radio"/>		
	Runs · sags	Fluid output			Too much	<input type="radio"/>		
		Spray distance			Too close	<input type="radio"/>		
		Solvent boiling point			Too high	<input type="radio"/>		
Too much bounce back	Terribly dirty	Spray air pressure			Too low	<input type="radio"/>		
		Paint resistance			Too low	<input type="radio"/>		
		Pattern width			Too wide	<input type="radio"/>		
		Intake of spray booth			Insufficient intake	<input type="radio"/>		
		Spray distance			Too far	<input type="radio"/>		