



Operation Manual

PRODUCT NAME

IONIZER

MODEL/Series

IZS31 series

SMC Corporation

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IONIZER

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to ISO 4414^{*1}, JIS B 8370^{*2} and other safety regulations.

*1) ISO 4414: Pneumatic fluid power –Recommendation for application of equipment to transmission and control systems

* 2) JIS B 8370: Pneumatic fluid power - General rules relating to systems



Caution

Operator error could result in injury or equipment damage.



Warning

Operator error could result in serious injury or loss of life.



Danger

In extreme conditions, there is a possibility of serious injury or loss of life.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



IONIZER

Safety Instructions

Caution

1.The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements". Read and accept them before using the product.

Limited warranty and Disclaimer

1.The warranty period of the product is 1 year in service or 1.5 years after the product is delivered.*2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Selection

Warning

- 1. This product is intended for use in general factory automation systems.**
If other applications (especially those stipulated in section 4 above) are used, please contact SMC beforehand.
- 2. Use within specified voltage and temperature limits.**
Using outside of specification voltage may cause malfunction, damage, electric shock and/or fire.
- 3. Use clean compressed air for fluid**
This product is not explosion proof. Never use a flammable gas or an explosive gas as a fluid and never use this product in the presence of such gases. Please contact us when fluids other than compressed air are used.
- 4. This product does not have an explosion-proof construction.**
Do not use this product in areas where dust explosion might be triggered or where flammable or explosive gas is present. It may cause explosion and/or fire.

Caution

- 1. This product has not been flushed. When bringing into a clean room, flush for several minutes and confirm the required cleanliness before using.**

Installation

Warning

- 1. Install only where there is adequate space for maintenance and wiring.**
When installing the electrical connector, ensure sufficient room is left for easy insertion and removal of electrical cable and Emitter cartridges
Do not install with sharp bends in the cable. With consideration of the minimum bend radii given below, ensure that cable entries are straight, and do not apply stress to the modular jack and plug.
If the plugs or fittings are subject to mechanical stress, malfunctions such as broken wires or fire may occur.
Minimum bending radius: Power supply cable, Connection cable A: 35 mm
Sensor cable, Connection cable B: 25 mm
(Note: Shown above is wiring with the fixed minimum allowable bending radius at a temperature of 20°C.
If used under this temperature, the connector can receive excessive stress even though the minimum bending radius is allowable.)
Regarding the minimum bending radius of the air tubing, refer to the operation manual or catalog for tubing.
- 2. Install only on a flat surface.**
A curved or uneven mounting surface may cause excessive force to be applied to the frame or case. This force, as well as a heavy impact (e.g. from dropping the Ionizer) may result in damage and failure.
- 3. Do not use in areas subject to electrical noise.**
It may cause malfunction, deterioration or damage to internal components. Take measures to prevent noise at source and avoid power and signal lines from coming into close contact.
- 4. Tighten with the specified torque.**
Refer to the following table for the correct tightening torque. If the tightening torque is exceeded the mounting screws and brackets may be broken. If the tightening torque is not reached, the mounting screws and brackets may become loose.

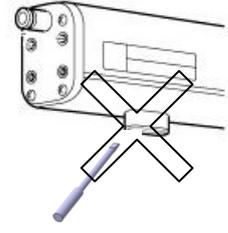
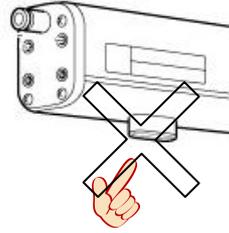
Screw size	Recommended tightening torque
M3	0.61 to 0.63 Nm
M4	0.73 to 0.75 Nm
M5	1.3 to 1.5 Nm

5. Do not touch the electrodes with a finger or metal tool directly. It may cause injury or malfunction.

If the emitters are touched with a finger, injury or damage may result or if the emitters are touched with metal tools damage may result. This may interfere with the specified function and performance, but may also cause operational failure or accident.

**Danger High Voltage**

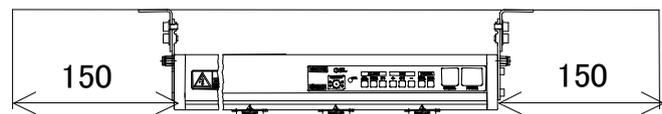
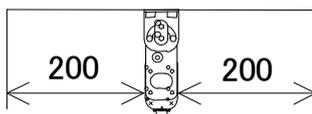
Emitters are under high voltage. Never touch them as there is a danger of electric shock or injury due to an evasive action against a momentary electrical shock caused by inserting foreign matter in the Emitter cartridge or touching the emitter.

**6. Do not affix any tape or seals to the body.**

If the tape or seal contains any conductive adhesive or reflective paint, a induction charging may occur due to ions arising from such substances, resulting in electrostatic charging or electric leakage.

7. Installation and adjustment should be conducted after turning off the power supply.**! Caution****1. Install the IZS31 series away from a wall as illustrated below.**

If a wall is located closer than the illustration below, the ions generated will not be able to reach the object which requires static neutralization and therefore result in a decrease in efficiency.



Unit: mm

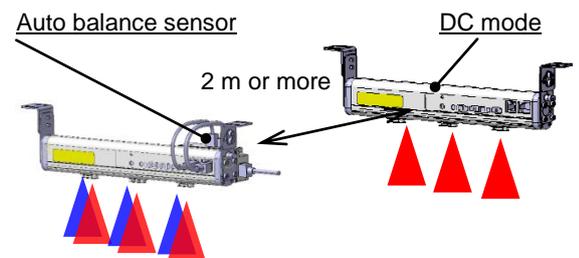
2. After installation, be sure to verify the effects of static neutralization.

The effects vary depending on the ambient conditions, operating conditions, etc. After installation, verify the effects of static neutralization.

3. When installing an ionizer with Auto balance sensor [body-mounting type] in proximity with an ionizer which operates in DC mode, they should be positioned at least 2m away from each other.

When using an Auto balance sensor [body-mounting type] near an ionizer in DC mode, keep clearance of at least 2 m between them.

Offset voltage may not be adjustable due to the ions which are discharged from the DC mode ionizer.

**Wiring and piping****! Warning**

1. Confirm that the power supply voltage is enough and that it is within the specifications before wiring.

2. To maintain product performance, a DC power supply shall be connected per UL listed Class 2 certified by National Electric Code (NEC) or evaluated as a limited power source provided by UL60950.

3. To maintain the product performance, make sure to ground the Ionizer according to this manual.

4. Be sure to turn off the power supply before wiring (including the removal and mounting of the plug).

5. To connect a Feedback sensor or Auto balance sensor to the ionizer, use the cable included with the sensor. Do not disassemble or modify the ionizer.

6. When applying the power supply, pay special attention to the wiring and/or surrounding environment until the safety is confirmed.
7. Do not put in the plug or disconnect any plugs including the power supply, while power is being supplied. Otherwise, the Ionizer may malfunction.
8. If the power line and high-voltage line are routed together, this product may malfunction due to noise. Therefore use a separate wiring route for this product.
9. Be sure to check correct wiring before operating the product. Incorrect wiring may lead to damage to and malfunction of the product.
10. Flush the piping before using. Before piping this product, exercise caution to prevent particles, water drops, or oil contents from entering the piping.

Operating Environment/Storage Environment

Warning

1. Observe the fluid temperature and ambient temperature range.

Fluid temperature and ambient temperature range for ionizer, Feedback sensor and Auto balance sensor are 0 to 50°C. Do not use the product in locations where the temperature may change suddenly even if the ambient temperature range is within the specified limits, resulting in condensation.

2. Do not use this product in an enclosed space.

This product utilizes a corona discharge phenomenon. Since this process generates a small amount of ozone and nitrogen oxide, only use the Ionizer in open, well-ventilated areas.

3. Environments to avoid

Avoid using and storing this product in the following environments since they may cause damage to this product.

- a. Avoid using in a place where the ambient temperature is outside the specified temperature range (0 to 50°C).
- b. Avoid using in a place where the ambient humidity is outside the specified humidity range (35 to 80% Rh)
- c. Avoid using in a place where condensation occurs due to a drastic temperature change.
- d. Avoid using in a place in the presence of corrosive or explosive gas or where there is a volatile combustible.
- e. Avoid using in an atmosphere where there are particles, conductive iron powders, oil mist, salt, solvent, blown dust, cutting oil (water, liquid), etc.
- f. Avoid using in a place where ventilated air from an air conditioner is directly applied to the product.
- g. Avoid using in a closed place without ventilation.
- h. Avoid using in direct sunlight or radiated heat.
- i. Avoid using in a place where there is a strong magnetic noise (strong electric field, strong magnetic field, or surge).
- j. Avoid using in a place where static electricity is discharged to the body.
- k. Avoid using in a place where a strong high frequency occurs.
- l. Avoid using in a place where this product is likely to be damaged by lightning.
- m. Avoid using in a place where direct vibration or shock is applied to the main body.
- n. Avoid using in a place where there is a force large enough to deform this product or weight is applied to the product.

4. Do not use an air containing mist or dust.

The air containing mist or dust will cause the performance to decrease and shorten the maintenance cycle. Install a dryer (IDF series), air filter (AF/AFF series), and/or mist separator (AFM/AM series) to obtain clean compressed air.

5. Ionizer, Feedback sensor and Auto balance sensor are not protected against a surge caused by a lightning.

Maintenance

Warning

(1) Periodically inspect the ionizer and clean the emitters (once in two weeks as a guide).

Periodically inspect the electrostatic sensor to check if it is operated while being out of order. Only a person having an adequate knowledge and experience about the system is allowed to inspect the sensor. If particles attach to the emitter by using for long periods of time, the charge neutralizing performance will be lowered.

Replace the Emitter cartridge, if the tip of emitter is worn and the charge neutralizing performance does not return even after being cleaned.



Danger High Voltage

This product contains a high voltage generation circuit. When performing maintenance inspection, be sure to confirm that the power supply to the ionizer is turned off. Never disassemble or modify the ionizer, as this may not only impair the product's functionality but could cause an electric shock or electric leakage.

(2) When cleaning the emitter or replacing the emitter cartridge, be sure to turn off the power supply or air supply to the body.

Touching an emitter when it is electrified may result in electric shock or other accidents.

(3) Perform the detection procedure in the absence of workpiece.

As the ionizer discharges ions during maintenance timing detection process, the workpiece may be charged.

(4) Do not disassemble or modify this product.

Otherwise, an electrical shock, damage and/or a fire may occur. Also, the disassembled or modify products may not achieve the performances guaranteed in the specifications, and exercise caution because the product will not be warranted.

(5) Do not operate this product with wet hands.

Otherwise, an electrical shock or accident may occur.

Caution

(1) Do not drop, bump or apply excessive impact (10G or more) while handling.

Even though it does not appear to be damaged, the internal parts may be damaged and cause a malfunction.

(2) When mounting/dismounting the cable, push the locking arm of the modular plug and attach/detach it correctly.

If the modular plug is at a difficult angle to attach/detach, the jack's mounting section may be damaged and cause a disorder.

1. Installation Method

1-1. Installation of Ionizer Body

We recommend investigating any environment where static electricity is generated, as well as, processes and parts where static electricity disturbances occur in advance. Verify that the required conditions have been met in order to effectively remove static electricity before installation.

(1) Installation height

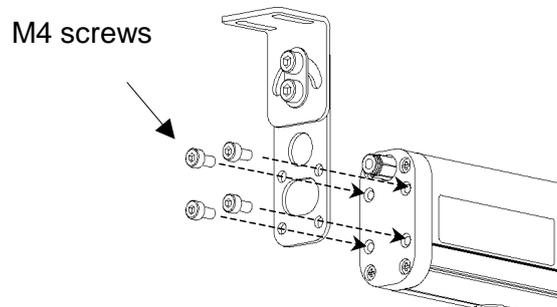
Install the ionizer within the distances indicated below from the object that is to be neutralized

Ion generation frequency [Hz]	Distance from the ionizer to the object to be neutralized [mm]	
	With air purge ^(Note)	Without air purge
1	400 to 2000	400 to 500
3	300 to 2000	300 to 400
5	300 to 2000	300 to 400
10	200 to 2000	200 to 300
15	200 to 2000	200 to 300
20	150 to 2000	150 to 250
30	50 to 2000	50 to 200
60	50 to 2000	50 to 150

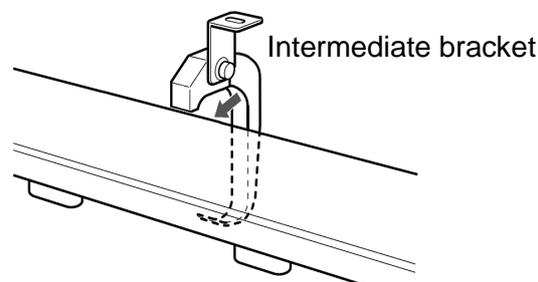
(Note) - After installation, verify the effects of static neutralization.

- Minimum installation height of the ionizer when using with a Feedback sensor shall be 200 mm
And the minimum installation height of the ionizer when using with an Auto balance sensor [High precision type] shall be 100 mm or higher. When operating the product outside of these conditions, confirm the proper operation of the sensor.

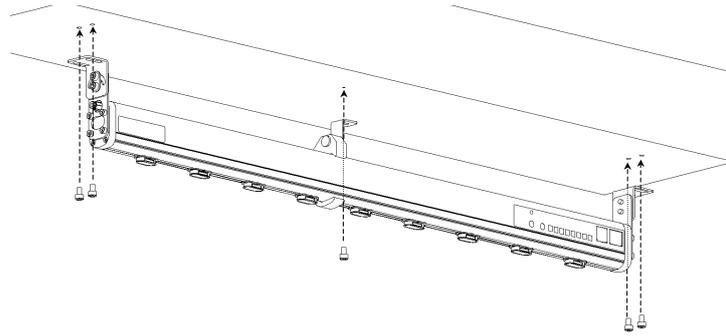
(2) Mount end brackets onto both ends of the ionizer body using the M4 screws supplied as accessories.



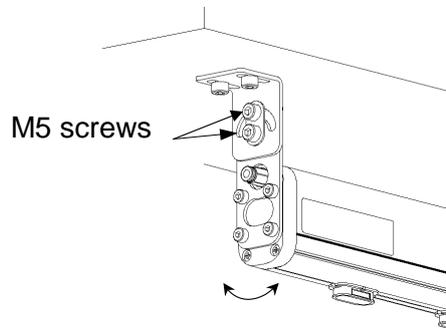
(3) Mount an intermediate bracket onto the center of the ionizer body.



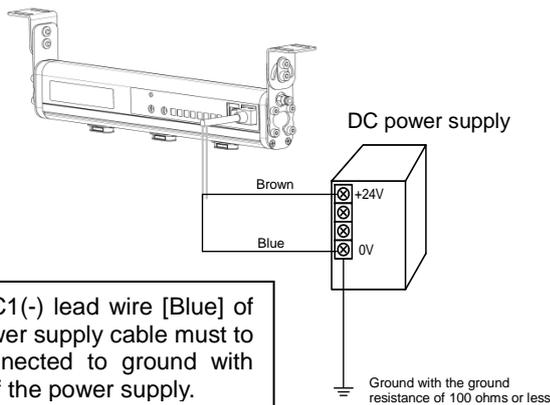
- (4) Tap M5 screw threads for the mounting brackets in the location the ionizer is to be installed. Attach the ionizer body and brackets with M5 screws.



- (5) Adjust the angle of the ionizer body to make the static neutralization effective, and fix with the rotating set screws (M5) of each bracket.

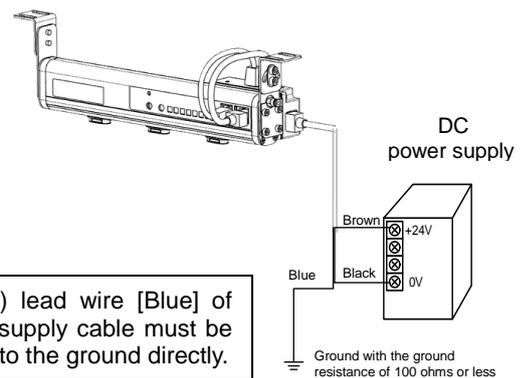


- (6) Make sure to ground with the ground resistance of 100 ohms or less by connecting DC1(-) lead wire [blue] of the power supply cable. Otherwise, the setting offset voltage may break, and electric shock and/or damage to the product and power supply may occur.



The DC1(-) lead wire [Blue] of the power supply cable must be connected to ground with GND of the power supply.

- With Feedback sensor
- With Auto balance sensor [High-Precision type]
- With no sensor



The DC1(-) lead wire [Blue] of the power supply cable must be connected to the ground directly.

- With Auto balance sensor [Body-mounting type]

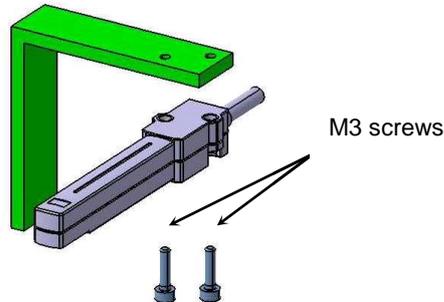
1-2. Installation of Feedback Sensor/Auto Balance Sensor [High-precision type]

(1) Installation of sensor head

- Feedback sensor

Install the product in a place where the detection port of the sensor head will aim at the object to be neutralized. It is recommended to position the detection port 10 to 50 mm from the surface of the object to be neutralized to prevent the sensor from coming in contact with the object to be neutralized. Detection area and sensor output are different depending on the installation distance.

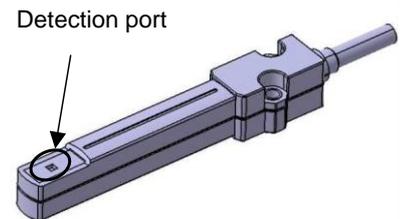
Mount the sensor head using two M3 screws (not supplied with the product).



Due to the construction of the sensor, the sensor head housing is shared with GND. Install and supply power with great caution to avoid short-circuit with the +24 V power supply.

The detection port is opened to detect static electricity. If foreign matter or other substances get inside the port or if tools come into contact with the inside of the detection port, it will lead to malfunction or breakage of the sensor, and the static electricity cannot be detected correctly. Please prevent foreign matter from getting inside the detection port, and be careful that tools do not come into contact with the inside of the port.

Do not pull the cable connected to the sensor head. Pulling the cable with excessive force may cause the sensor head to break or break the wire.

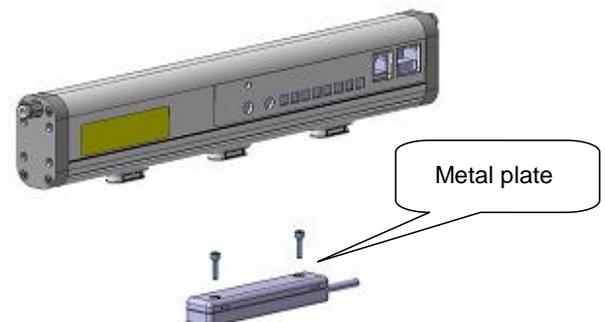


- Auto balance sensor [High-precision type]

Install the Auto balance sensor directly under the ionizer so that it is placed parallel to the ionizer and the metal plate surface is facing the ionizer. Offset voltage varies depending on the installation height. Install the Auto balance sensor as close to the same height as possible to the workpiece. The Auto balance sensor can be removed after adjusting the balance.

Keep the distance between the Auto balance sensor and the ionizer within the installation height range stated in 2-1 (1).

Mount the sensor head using two M3 screws (not supplied with the product).

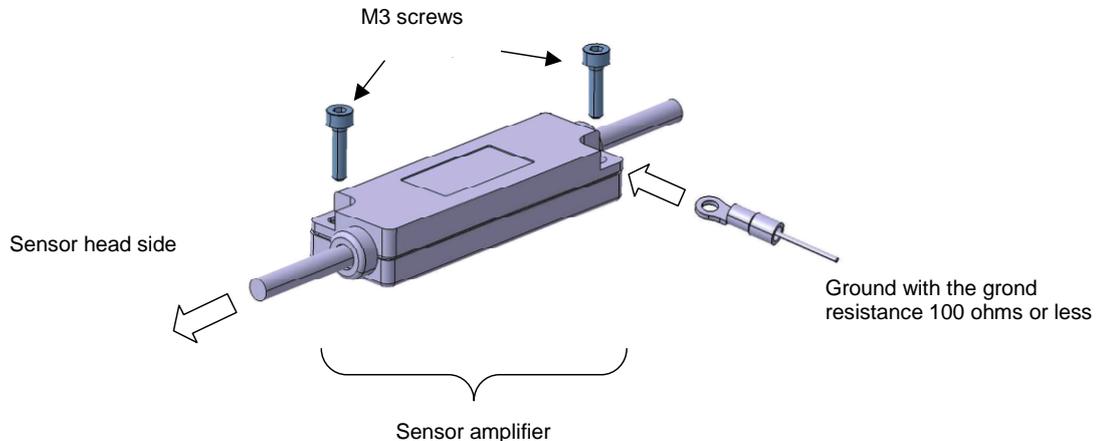


(2) Installation of sensor amplifier

Mount the sensor amplifier using two M3 screws (not supplied with the product).

Do not pull the cable connected to the sensor amplifier. Pulling the cable with excessive force may cause sensor amplifier to break or break the wire.

Make sure to ground the sensor amplifier case with the ground resistance 100 ohms or less. As the external surface of the sensor amplifier case is plated with conductive substance, F.G. wiring is not necessary when it is mounted on the product which has been grounded. When the mounting surface is insulated with paint, anodic oxide coating, etc., connect wires and make sure to ground at resistance less than 100 ohms.



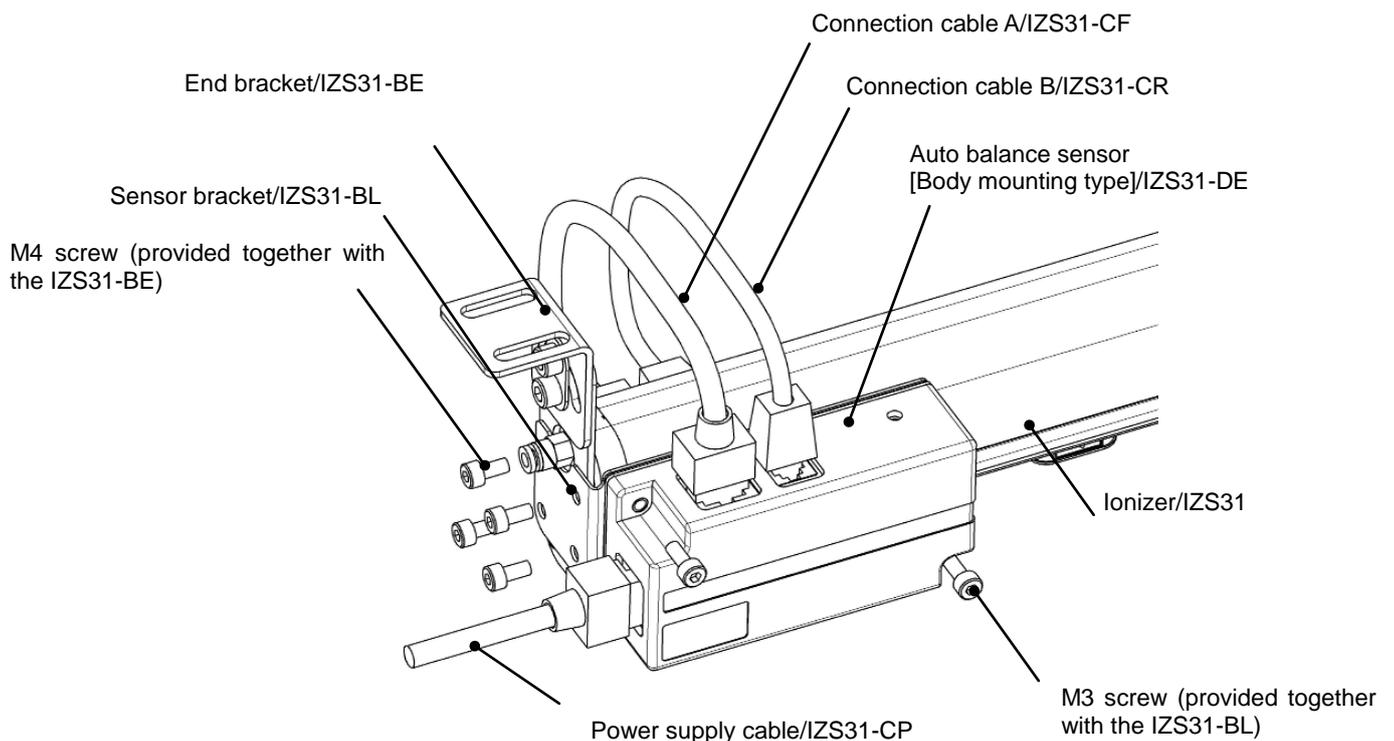
Recommended crimped terminal: TMEN1.25-3, an insulation coated crimped terminal manufactured by Nichifu. Co.Ltd.

1-3. Installation of Auto balance sensor [Body-mounting type]

Mount the sensor bracket (IZS31-BL) on the ionizer with four M4 screws^(*), and mount the Auto balance sensor on the sensor bracket with two M3 screws. * Tighten together with the end bracket (IZS31-BE).

Plug the modular plug of the power supply cable (IZS31-CP) into the modular jack, labeled "POWER IN", of the Auto balance sensor.

Plug the modular plug of the Connection cable A (IZS31-CF) into the modular jack, labeled "POWER OUT", of the Auto balance sensor and the modular jack, labeled "POWER", of the ionizer. And then, plug the modular plug of the Connection cable B (IZS31-CR) into the modular jack, labeled "SIGNAL", of the Auto balance sensor and the modular jack, labeled "SIGNAL", of the ionizer body.

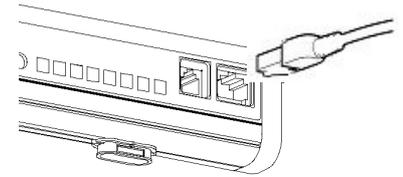


1-4. Cable Connection

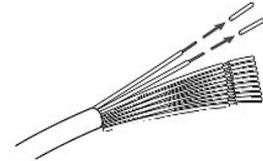
- (1) Plug the modular plug of the power supply cable (IZS31-CP) into the modular jack, labeled "POWER", of the ionizer body.

When using the Auto balance sensor [Body mounting type], plug the modular plug of the power supply cable into the modular jack, labeled "POWER IN", of the Auto balance sensor.

When the modular plug is properly connected, the lever locks in and makes an audible locking sound. Hold the cable with a tie-band at a position close to the joint to avoid excessive force being applied to the modular jack and plug.

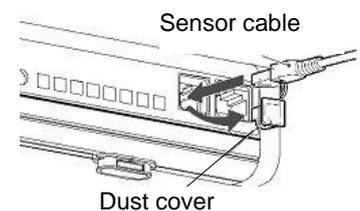


- (2) Connect the lead wires according to the wiring tables shown in Section 3 "Selection and setting of product". Refer to the Cable specifications, and make sure to connect wires to each terminal using crimp terminal etc. Unused wires should be cut short to prevent them from getting in contact with other wires, or fix with plastic tape without peeling the coating off.



Cable specifications of Lead wire with modular plug	Number of cable wire / AWG		12C / AWG26
	conductor	Nominal cross section area	0.14 mm ²
		External diameter	0.48 mm
	Insulation	External diameter	0.95 mm
		Color	Brown, Blue, Dark green, Gray, White, Orange, Red, Yellow, Purple, Light green, Pink, Black
	Sheath	Material	Lead-free PVC
	Finished external diameter		6.2 mm

- (3) When using the Feedback sensor or Auto balance sensor [High-precision type/Body-mounting type], remove the dust cover of the modular jack, labeled "SENSOR", of the ionizer body and plug the modular plug of each sensor cable. When the modular plug is properly connected, the lever locks in and makes an audible locking sound. Hold the cable with a tie-band at a position close to the joint to avoid excessive force being applied to the modular jack and plug.



2. Installation Method

2-1. Run Mode

There are 3 different run modes (Sensing DC mode / Pulse DC mode / DC mode) for the IZS31, which can be selected based on the application and operating condition.

(1) Sensing DC mode

A Feedback sensor detects the charged condition of the workpiece and transfers feedback to the ionizer. With this mode, ions with optimal polarity are discharged to shorten the discharge time of static neutralization. When the charged potential of the workpiece becomes within $\pm 30\text{ V}$ ^(note), the static neutralization completion signal is turned OFF.

This mode is suited for the static neutralization of heavily charged workpiece.

Either "Energy Saving Run" or Continuous static neutralization Run" can be selected depending on the ionizer's operation after static neutralization is completed.

Energy saving run	The ionizer stops emitting ions automatically after the static neutralization is completed. When the charged potential of the workpiece becomes outside of $\pm 30\text{ V}$ ^(note) , the ion will be emitted again. Energy saving run mode is recommended for static neutralization of a conductive workpiece.
Continuous static neutralization run	To maintain the charged potential of the workpiece within $\pm 30\text{ V}$ ^(note) even after the static neutralization is completed, this run mode controls the offset voltage and performs the static neutralization continuously with pulse DC. Continuous static neutralization run mode is recommended for static neutralization of an insulated workpiece.

Note: When the Feedback sensor installation height is 25 mm

(2) Pulse DC mode

Alternatively emits Positive and negative ions.

- When the Auto balance sensor [High-precision type] is used

The offset voltage is adjusted automatically to within $\pm 30\text{ V}$. If the offset voltage becomes outside of $\pm 30\text{ V}$ due to deposit the contamination on the tip of the emitter, Maintenance timing detected signal will be output.

Either "Manual operation" or "Automatic operation" can be selected depending on the method of offset voltage adjustment.

Manual operation	When Maintenance timing detection signal is input or when power is supplied to the ionizer, the offset voltage adjustment starts. Manual operation is recommended for static neutralization of moving workpiece. Perform the offset voltage adjustment before starting operation of the equipment.
Automatic operation	This operation method adjusts the offset voltage continuously. Automatic operation mode is recommended for static neutralization of stationary workpiece or for static neutralization of objects in the specified area.

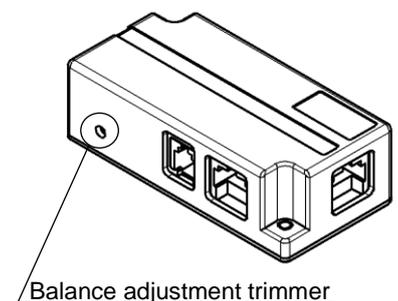
- When the Auto balance sensor [Body-mounting type] is used

The offset voltage is adjusted to maintain the initial setting. If the offset voltage is judged to be difficult to control due to deposit the contamination on the tip of the emitter, Maintenance timing detected signal will be output. The initial setting of the offset voltage is performed with the Balance adjustment trimmer of the Auto balance sensor. It is necessary to check the offset voltage by measuring instrument separately like an electrostatic monitor and so on.

- When a sensor is not used

The offset voltage is adjusted with the Balance adjustment trimmer on the main body of IZS31.

It is necessary to check the offset voltage by measuring instrument separately like an electrostatic monitor and so on.



(3) DC mode

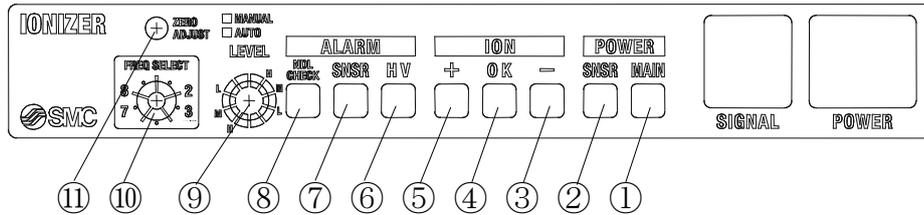
Continuously emits positive or negative ions whichever are selected. Parts other than the object need to be appropriately grounded to prevent from being charged.

2-2. Maintenance timing for emitter detection

When the maintenance timing detection signal is input, the deterioration of the static neutralization capacity due to the appearance of deposits on the tip of emitter is detected. If it becomes necessary to clean the emitter due to the deterioration of the static neutralization capacity, the maintenance LED will light and the maintenance timing detected signal will be output.

It is not possible to detect the deterioration of static neutralization capacity only by connecting a Feedback sensor or Auto balance sensor [High precision type/Body-mounting type]. Therefore, input the maintenance timing detection signal periodically to check if the static neutralization capacity is deteriorated.

2-3. Indication/Setting Parts Description



No.	Indication	Type	Description
(1)	Power supply	LED (Dark green)	Illuminates when power is supplied. Flashes when the supply voltage is irregular.
(2)	Sensor connection	LED (Dark green)	Illuminates when the Feedback sensor or Auto balance sensor [High precision type/Body-mounting type] is connected.
(3)	Negative	LED (Blue)	Functionality differs depending on the operation mode. Refer to "3. Selection and Setting of Production" for details.
(4)	Completion	LED (Dark green)	
(5)	Positive	LED (Orange)	
(6)	Incorrect high voltage	LED (Red)	Illuminates when irregular current flows through the emitter.
(7)	Sensor failure	LED (Red)	Illuminates when the connected some kind of the sensor or auto balance sensor does not operate correctly.
(8)	Maintenance	LED (Red)	Illuminates when maintenance timing is detected . It flashes while the detecting.
(9)	Maintenance timing level selection	Rotary switch	Functionality differs depending on the run mode. Refer to "4. Selection and Setting of Product" for details.
(10)	Frequency selection	Rotary switch	
(11)	Balance adjustment trimmer	Trimmer	Used to adjust the offset voltage when the Auto balance sensor [High-precision/Body-mounting type] is not used.

3. Selection and Setting of Product

3-1. Sensing DC Mode

(1) Bar length selection

- Select the appropriate length suited for a work size by referring to the static neutralization characteristics, static neutralization area, etc.

(2) Ionizer body installation

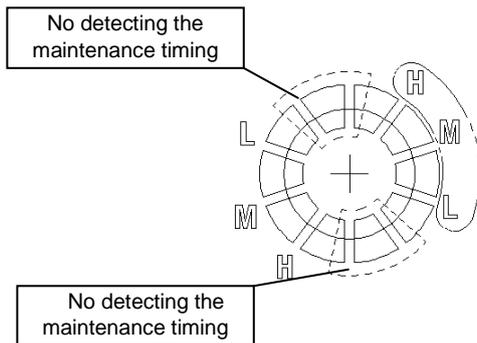
- Install the Ionizer within 200 to 2000mm. Although the ionizer can be used at 2000mm or more, the performance may not be fulfilled on depending environmental condition such as the airflow, influence of dielectric, ground condition and so on. Be sure to conduct validation and verification of the product in actual condition of operating environment before use.

(3) Sensor installation

- Install the Feedback sensor so that the detection port is facing the charged surface.
- The recommended installation height is 10 to 50 mm. The sensor can be used at a distance out of this range, but the performance may diminish depending on the operating conditions. Be certain to confirm the normal operation before starting operation.
- By connecting the ionizer and the Feedback sensor, the Sensing DC mode is set automatically.

(4) Maintenance timing level selection switch setting

- Set the detection level of the maintenance timing for emitter.
- Set the detection level to H (High), M (Middle) or L (Low). At setting other than these, the ionizer does not perform the maintenance timing detection.



H (High) Level that does not affect the decay time for static neutralization time.

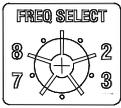
M (Middle): Level at which the decay time for static neutralization is a little bit longer than it was initially.

L (Low) : Level that gives the alarm before static neutralization can not be performed.

- Maintenance timing detection is performed when the maintenance timing detection signal is turned ON.

(5) Frequency selection switch setting

- Select "Energy saving run" or "Continuous static neutralization run".
- In case of "Continuous static neutralization run", select the ion generating frequency after the static neutralization is completed.



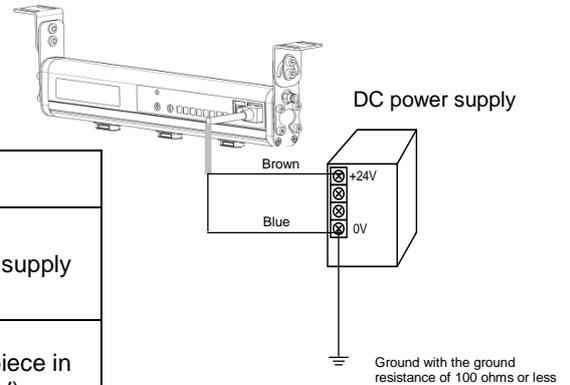
	Operation details		Switch setting
Energy saving run	Automatically stop emitting ions after the static neutralization is completed.		8
Continuous static neutralization run	Continuously neutralize the workpiece with pulse DC by controlling the offset voltage so that the charged potential on a workpiece would be within +/-30V even after static neutralization is completed. The ionizer generates ion at the preset frequency.		0: 1Hz 1: 3Hz 2: 5Hz 3: 10Hz 4: 15Hz 5: 20Hz 6: 30Hz 7: 60Hz

(6) Wiring of Power supply cable

- Connect the special power supply cable to the unit.

• Connection to the power supply for ionizer driving

Symbol	Cable color	Items	Necessity of wiring	Description
DC1(+)	Brown	Power supply: +24 V	○	Ionizer driving power supply
DC1(-)	Blue	Power supply: 0V / F.G	○	
OUT4	Dark Green	Sensor monitor output	△	Outputs the electrical potential of the workpiece in analog signal (1 to 5 V)



* Make sure to ground the DC1(-)[Blue] with the ground resistance 100 ohms or less. Otherwise, breakage may occur.

• Connection to the power supply for I/O signal

Symbol	Cable color	Items	Necessity of wiring	Description
DC2 (+)	Red	Power supply: +24V	○	I/O signal power supply
DC2 (-)	Black	Power supply 0V	○	
IN1	Light green	Discharge stop signal	○	Signal for start/stop of the ion emission (NPN) Turned to the run mode when connected to DC2(-) [Black]. (PNP) Turned to the run mode when connected to DC2(+) [Red].
IN2	Gray	Maintenance timing detection signal	△	Signal for detecting the maintenance for emitter.
-	White	-	-	-
-	Orange	-	-	-
OUT1	Pink	Static neutralization complete signal	△	Turned ON when the electrical potential of the workpiece is outside of +/-30 V or during maintenance timing detection.
OUT2	Yellow	Maintenance timing detected signal	△	Turned ON when maintenance timing is detected.
OUT3	Purple	Error signal	△	Turned ON in normal operation. Turned OFF in case of various errors.

○: Minimum wiring requirement for ionizer operation.

△: Wiring necessary to use various functions

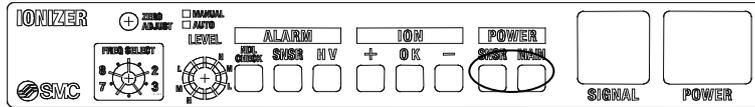
-: Wiring unnecessary for the sensing DC mode. These wires should not be short-circuited with other wires.

(7) Air pressure piping

-For single side piping, plug the unused port with M-5P delivered with the product.

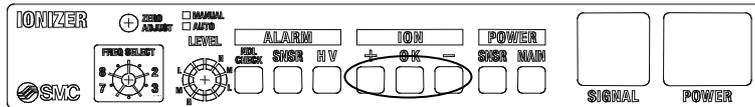
(8) LED indication

- POWER LED: Indicates the state of power supply input and sensor connection.



LED name		Function
POWER	MAIN	Indicate that the power is supplied. (Dark green-lighting) (Flashes when the power supply voltage is irregular.)
	SNSR	Indicate that the Feedback sensor is connected.(Dark green-lighting)

- ION LED: Indicates the charged condition of the workpiece.

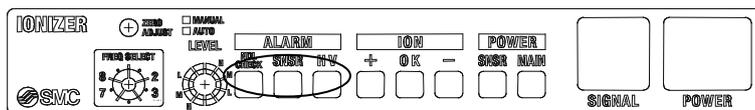


LED name		Function
ION	+	Indicates that the electrostatic charge of the workpiece is positive (Orange-lighting)
	OK	Indicates that the electrostatic charge of the workpiece is low (Dark green-lighting)
	-	Indicates that the electrostatic charge of the workpiece is negative (Blue-lighting)

-The charged condition of the workpiece can be checked by seeing the LED indication.

Workpeice charged polarity	LED + OK -	Workpeice charge voltage	
Positive ↑ Charge neutralization completed ↓ Negative	■ □ □	+400V or more	■ Light on ■ Flash at 4Hz □ Light off
	■ □ □	+100V to +400V	
	■ ■ □	+30V to +100V	
	□ ■ □	Within +/-30V	
	□ ■ ■	-30V to -100V	
	□ □ ■	-100V to -400V	
	□ □ ■	-400V or lower	

- ALARM LED: Indicates the abnormal states of the ionizer.



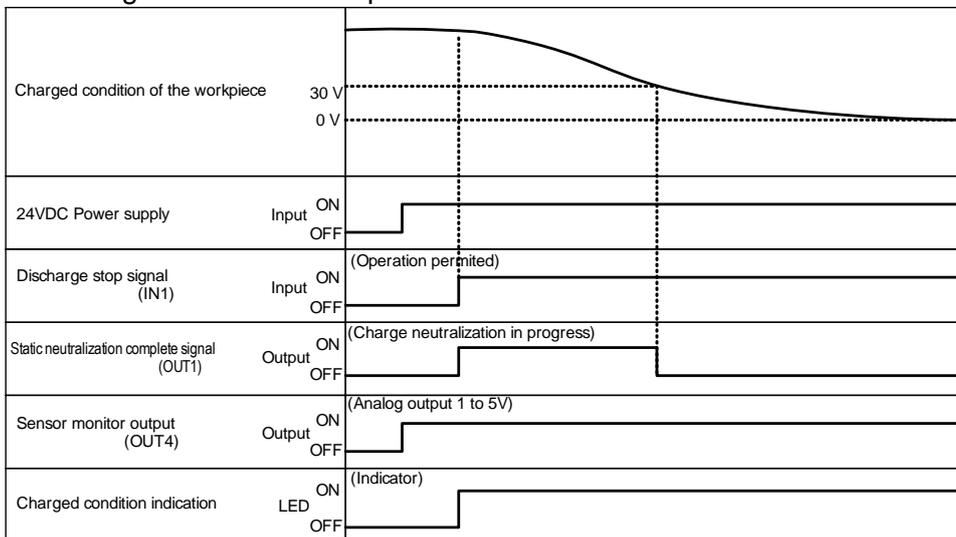
LED name		Function
ALARM	HV	Indicate that abnormal current flows to the emitter. (Red-lighting)
	SNSR	Indicate that the Feedback sensor does not operate correctly (Red lighting)
	NDL	Indicate that it is necessary to maintain the emitter (Red-lighting)
	CHECK	(It flashes while the maintenance timing detection is being performed.)

(9) Alarm

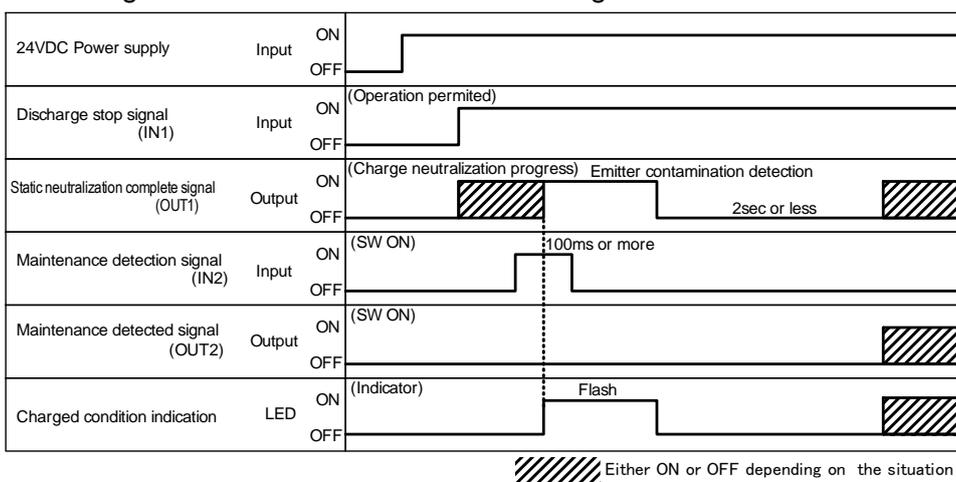
Alarms	Details	How to reset
High voltage error	Gives notification of the occurrence of an abnormal current such as high-voltage leakage. The ionizer stops static neutralization discharge, turns on the HV ALARM indicator, and the error signal (OUT3) is turned OFF.	Turn OFF the power supply, solve the problem, and then turn the power supply on again. Alternatively turn the discharge stop signal (IN1) OFF then ON.
Sensor error	Gives notification that the Feedback sensor has become unable to operate normally. The ionizer stops static neutralization discharge, turns on the SNSR ALARM indicator, and the error signal (OUT3) is turned OFF.	Turn OFF the power supply, solve the problem, and then turn the power supply on again. Alternatively turn the discharge stop signal (IN1) OFF then ON.
CPU error	Gives notification of the occurrence of a failure in the CPU due to noise, etc. The ionizer stops static neutralization discharge, all of the LED indicators flash, and the error signal (OUT3) is turned OFF.	Turn OFF the power supply, solve the problem, and then turn the power supply on again. Alternatively turn the discharge stop signal (IN1) OFF then ON.
Maintenance timing detected	Gives notification that emitter maintenance is necessary. The NDL CHECK ALARM indicator comes on and a maintenance timing detected signal (OUT2) turns ON	Turn OFF the power and clean or replace the emitter. And then, turn the power supply on again. And Adjust the offset voltage after supplying power.

(10) Timing chart

• Timing chart of normal operation



• Timing chart of emitter maintenance timing detection



- During the maintenance timing detection is ON, the static neutralization complete signal is turned ON.
- Ions are emitted from ionizer to detect the timing for emitter maintenance timing, and the workpiece may therefore be charged. Perform this detection procedure in the absence of workpiece.

3-2. Pulse DC Mode

(1) Bar length selection

-Select the appropriate length suited for a work size by referring to the static neutralization characteristics, static neutralization area, etc..

(2) Ionizer body installation

- Install the Ionizer within 50 to 2000mm. However, install the ionizer at a distance from 100 to 2000mm when using the Auto balance sensor [high-precision type]. Although the ionizer can be used at 2000mm or more, the performance may not be fulfilled on depending environmental condition such as the airflow, influence of dielectric, ground condition and so on. Be sure to conduct validation and verification of the product in actual condition of operating environment before use.

(3) Sensor installation (When using the Auto balance sensor)

- In case of using the Auto balance sensor [High-precision type]
 - Install beneath the ionizer so that the metal plate faces the ionizer at the same level as the workpiece.
 - When the sensor is connected, the setting of the balance adjustment trimmer on the body is nullified.
- In case of using the Auto balance sensor [Body-mounting type]
 - When using the Auto balance sensor [Body-mounting type], fix it to the ionizer body with a sensor bracket (IZS31-BL). And then connection cables A (IZS31-CF) and B (IZS31-CR) to the ionizer and Auto balance sensor.
 - When the sensor is connected, the setting of the balance adjustment trimmer on the body is nullified.

(4) Frequency selection switch setting

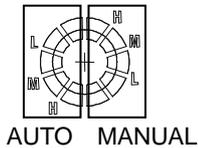
- Select the ion generating frequency.



Ion generating frequency	Switch setting
1Hz	0
3Hz	1
5Hz	2
10Hz	3
15Hz	4
20Hz	5
30Hz	6
60Hz	7

(5) Balance adjustment trimmer setting

- Auto balance sensor [High-precision type]
 - Select "Manual operation" or "Automatic operation" when the Auto balance sensor [High-precision type] is connected to adjust the offset voltage.

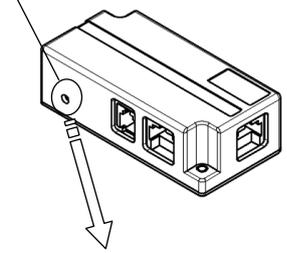


	Operation details	Switch setting
Manual operation	When maintenance detection signal is input or the ionizer turned on, the ionizer adjust the offset voltage and detect the maintenance timing detection according to the balance adjustment and the set detection level. The offset voltage value adjusted per ion generating frequency is maintained. When changing the ion generating frequency, adjust the offset voltage. The Auto balance sensor can be removed after the adjustment. (When the Auto balance sensor is connected again, the ion balance will be readjusted.)	MANUAL
Automatic operation	The ionizer continuously adjusts the offset voltage. When the Auto balance sensor is removed adjust the offset voltage manually using the balance adjustment trimmer.	AUTO

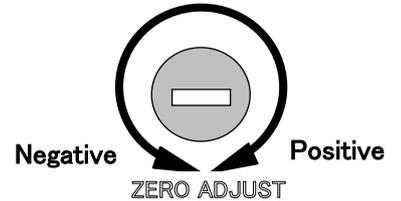
* Set the switch according to the maintenance timing detection level

- Auto balance sensor [Body-mounting type]
 - When the Auto balance sensor [Body mounting type] is used, the offset voltage is adjusted to maintain the initial setting. To set the offset voltage, adjust it manually using the Balance adjustment trimmer of the Auto balance sensor. It is necessary to check the offset voltage by measuring instrument separately like an electrostatic monitor and so on. The offset voltage is offset to the positive side by rotating the Balance adjustment trimmer in the clockwise direction. The offset voltage is offset to the negative side by rotating the Balance adjustment trimmer in the counterclockwise direction.

Balance adjustment trimmer

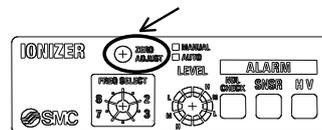


The trimmer turns up to two rotations.



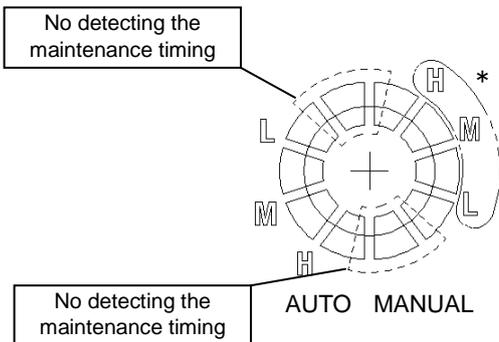
- When using no Auto balance sensor
 - Set the maintenance level selection switch to AUTO, and adjust the offset voltage manually using the Balance adjustment trimmer.

Balance adjustment trimmer



(6) Maintenance timing level selection switch setting

- When using the Maintenance timing detection function, set the detection level regardless of whether the Auto balance sensor is used or unused.
- Set the detection level to H (High), M (Middle) or L (Low). Maintenance timing detection is not performed at the detection level other than the specified above.



- H (High) Level that does not affect the static neutralization time.
- M (Middle): Level at which the static neutralization time is a little bit longer than it was initially.
- L (Low) : Level that gives the alarm before static neutralization can not be performed.

* When the Auto balance sensor [High-precision type] is used, set the trimmer according to the operation mode of the Auto balance sensor. e.g.) When adjusting the offset voltage in manual operation using the Auto balance sensor [High-precision type], select the maintenance timing detection level from H, M or L on the MANUAL side.

- Maintenance timing detection is performed when the maintenance timing detection signal is input.
- When the Auto balance sensor [High-precision type] is used, the Balance adjustment is performed automatically after the Maintenance timing detection by setting the detection level to H, M or L.

(7) Wiring of Power supply cable

- Connect the special power supply cable (IZS31-CP etc.) to the unit.

● Connection to the power supply for ionizer operation

Symbol	Cable color	Items	Necessity of wiring *		Description
			With auto balance sensor [High-precision type] With no sensor	With auto balance sensor [Body mounting type]	
DC1 (+)	Brown	Power supply: +24V	○	-	Ionizer driving power supply
DC1 (-)	Blue	Power supply: 0V/ F.G*	○	○ [FG only]	
OUT4	Dark green	Sensor monitor output	-	-	-

* When an auto balance sensor [High-precision type] is used or when no sensor is used, connect the DC1(-) [Blue] to the power supply GND, and make sure to ground with the ground resistance of 100 ohms or less. Otherwise, damage may occur.

* When the Auto balance sensor [Body-mounting type] is used, do NOT connect the DC1(-) [Blue] to the power supply GND, but make sure to ground with the ground resistance of 100 ohms or less directly.

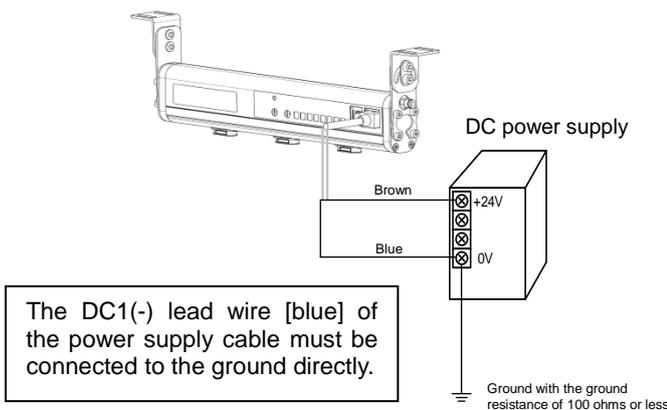
● Connection to the power supply for I/O signal

Symbol	Cable color	Items	Necessity of wiring (Common)	Description
DC2 (+)	Red	Power supply: +24V	○	Input/output signal power supply
DC2 (-)	Black	Power supply: 0V	○	
IN1	Light green	Discharge stop signal	○	Signal for start/stop of the ion emission (NPN) Turned to the run mode when connected to DC2(-) [Black]. (PNP) Turned to the run mode when connected to DC2(+) [Red].
IN2	Grey	Maintenance detection signal	△	Signal for detecting the maintenance for emitter.
-	White	-	-	-
-	Orange	-	-	-
OUT1	Pink	Static neutralization complete signal	△	Turned ON when the electrical potential of the workpiece is outside of +/-30 V or during maintenance timing detection.
OUT2	Yellow	Maintenance detected signal	△	Turned ON when maintenance timing is detected.
OUT3	Purple	Error signal	△	Turned ON in normal operation. Turned OFF in case of various error.

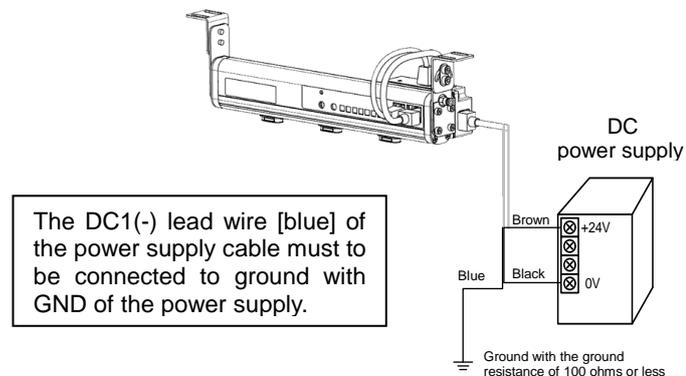
○: Minimum wiring requirement for ionizer operation.

△: Wiring necessary to use various functions

—: Wiring unnecessary for the Pulse DC mode. These wires should not be short-circuited with other wires.



- With Feedback sensor
- With Auto balance sensor [High-precision type]
- With no sensor



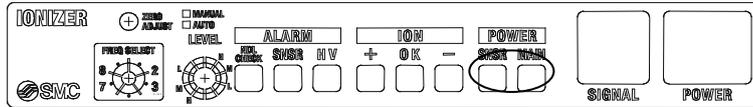
- With Auto balance sensor [Body-mounting type]

(8) Air pressure piping

-For single side piping, plug the unused port with M-5P delivered with the product.

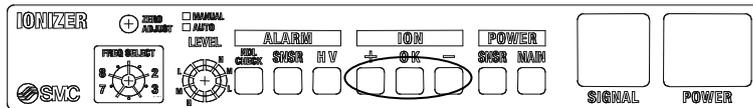
(9) LED indication

- POWER LED: Indicates the state of power supply input and sensor connection.



LED name		Function
POWER	MAIN	Indicate that the power is supplied. (Dark green-lighting) (Flashes when the power supply voltage is irregular.)
	SNSR	Indicate that the Auto balance sensor is connected.(Dark green-lighting)

- ION LED: Indicates the polarity of the discharge ion and the offset voltage status.



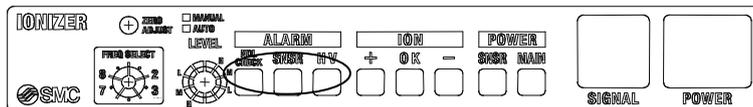
LED name		Function
ION	+	Indicates that the ionizer discharges positive ions (Orange-lighting)
	OK	When connecting the Auto balance sensor [High-precision type]: Indicates the offset voltage condition (Dark green-lighting). When Auto balance sensor [Body-mounting type] is used: Goes off. When Auto balance sensor is not used: Goes off.
	-	Indicates that the ionizer discharges negative ions (Blue-lighting)

- When Auto balance sensor [High-precision type] is used, the offset voltage condition can be checked with the OK LED indication.

Ion balance	OK LED
Within +/-30 V	Lighting (or Flash)
Outside of +/-30 V	Goes off

* OK LED Flashes when the offset voltage is near the adjusting target to notify the emitter maintenance timing is coming soon.

- ALARM LED: Indicates the abnormal states of the ionizer.



LED name		Function
ALARM	HV	Indicate that abnormal current flows to the emitter. (Red-lighting)
	SNSR	Indicate that the Auto balance sensor does not operate correctly (Red lighting)
	NDL CHECK	Indicate that it is necessary to maintain the emitter (Red-lighting) (It flashes while the maintenance timing detection is being performed.)

(10) Alarm

Alarms	Details	How to reset
High voltage error	Gives notification of the occurrence of an abnormal current such as high-voltage leakage. The ionizer stops ion emission, turns on the HV ALARM indicator, and the error signal (OUT3) is turned OFF.	Turn OFF the power supply, solve the problem, and then turn the power supply on again. Alternatively turn the discharge stop signal (IN1) OFF then ON.
Sensor error	Gives notification that the Auto balance sensor has become unable to operate normally. The ionizer stops ion emission, turns on the SNSR ALARM indicator, and the error signal (OUT3) is turned OFF.	Turn OFF the power supply, solve the problem, and then turn the power supply on again. Alternatively turn the discharge stop signal (IN1) OFF then ON.
CPU error	Gives notification of the occurrence of a failure in the CPU due to noise, etc. The ionizer stops ion emission, all of the LED indicators flash, and the error signal (OUT3) is turned OFF.	Turn OFF the power supply, solve the problem, and then turn the power supply on again. Alternatively turn the discharge stop signal (IN1) OFF then ON.
Maintenance timing detected	Gives notification that emitter maintenance is necessary. The NDL CHECK ALARM indicator comes on and a maintenance timing detected signal (OUT2) turns ON	Turn OFF the power and clean or replace the emitter. And then, turn the power supply on again. And Adjust the offset voltage after supplying power.

(11) Timing chart

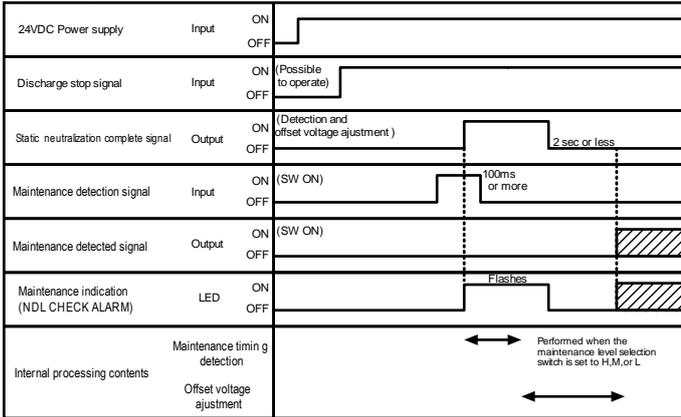
• Timing chart of normal operation

	Normal operation	Reset operation	Remarks
24V DC power supply Input	ON OFF	OFF ON	Turn the power off to solve the problem, then supply power again. The error signal(OUT3) will be reset.
Discharge stop signal (IN1) Input	ON OFF	OFF ON	
State of ion emission	ON OFF	ON OFF	* The error signal(OUT3) can be reset by the discharge stop signal(IN1) to OFF and ON
Error signal (OUT3) Output	ON OFF	ON OFF	Turned ON in normal operation Turned OFF in case of various error

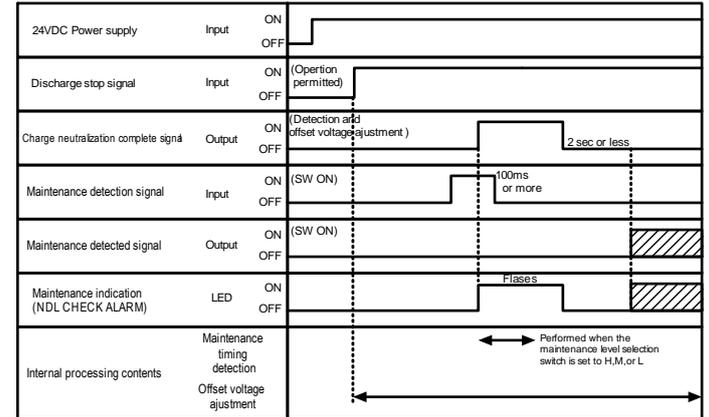
• Timing chart of emitter contamination detection/offset voltage adjustment

(a) When auto balance sensor [high-precision type] connected

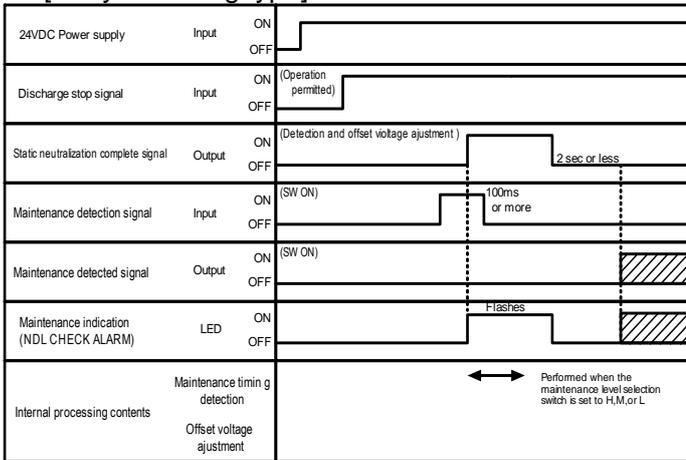
(1) Manual operation



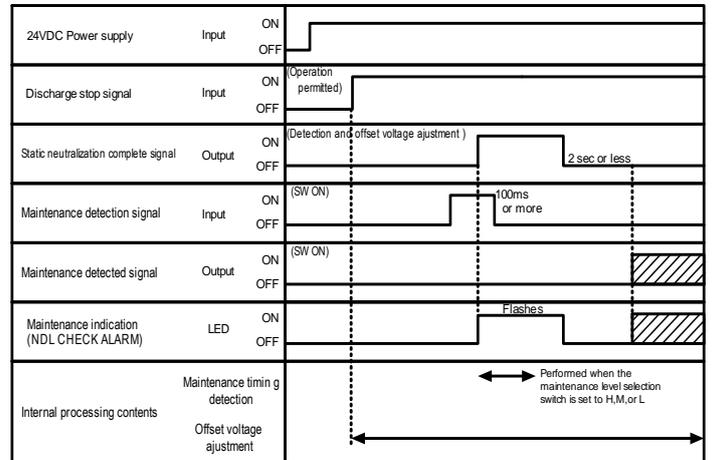
(2) Automatic operation



(b) When auto balance sensor [Body mounting type] connected



(c) With no Auto balance sensor connected



- During the maintenance timing detection is ON, the static neutralization complete signal will be turned ON.
- Ions are emitted from ionizer to detect the timing for emitter maintenance timing, and the workpiece may therefore be charged. Perform this detection procedure in the absence of workpiece.

3-3. DC Mode

(1) Bar length selection

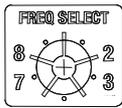
-Select the appropriate length suited for a work size by referring to the static neutralization characteristics, static neutralization area, etc.

(2) Ionizer body installation

- Install the Ionizer within 50 to 2000mm. Although the ionizer can be used at 2000mm or more, the performance may not be fulfilled on depending environmental condition such as the airflow, influence of dielectric, ground condition and so on. Be sure to conduct validation and verification of the product in actual condition of operating environment before use.

(3) Frequency selection switch setting

- Select positive ion discharge of negative ion discharge.



Ion polarity	Switch setting
Positive ion discharge	8
Negative ion discharge	9

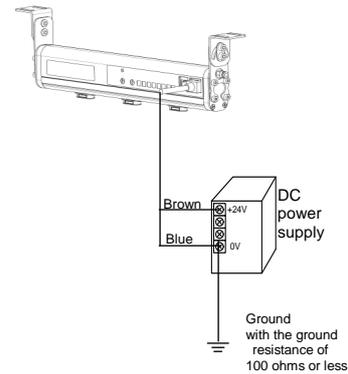
(4)Wiring of Power supply cable

- Connect the special power supply cable to the unit.

• Connection to the power supply for driving ionizer

Symbol	Cable color	Items	Necessity of wiring	Description
DC1(+)	Brown	Power supply: 24VDC	○	Ionizer driving power supply
DC1(-)	Blue	Power supply: 0V / FG	○	
OUT4	Dark green	Sensor monitor output	-	-

* Make sure to ground DC1(-) lead wire [Blue] of the power supply cable with the ground resistance of 100 ohms or less. Otherwise, breakage may occur.



• Connection to the power supply for I/O signal

Symbol	Cable color	Items	Necessity of wiring	Description
DC2(+)	Red	Power supply: 24VDC	○	Input/output signal power supply
DC2(-)	Black	Power supply GND	○	
IN1	Light green	Discharge stop signal	○	Signal for start/stop of the ion emission (NPN) Turned to the run mode when connected to DC2(-) [Black]. (PNP) Turned to the run mode when connected to DC2(+) [Red].
IN2	Gray	Maintenance timing detection signal	-	-
-	White	-	-	-
-	Orange	-	-	-
OUT1	Pink	Static neutralization complete signal	-	-
OUT2	Yellow	Maintenance timing detected signal	-	-
OUT3	Purple	Error signal	△	Turned ON in normal operation. Turned OFF in case of various errors.

○ : Wiring necessary at least to operate the ionizer

△ : Wiring necessary to use functions

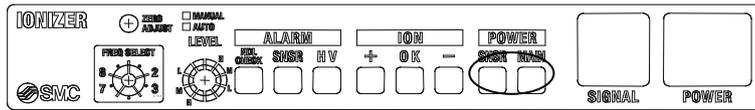
— : Wiring unnecessary for the DC mode. These wires should not be short-circuited with other wires.

(5) Air pressure piping

For single side piping, plug the unused port with M-5P delivered with the product.

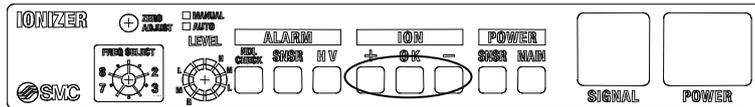
(6) LED indication

- POWER LED: Indicates the state of power supply input and sensor connection..



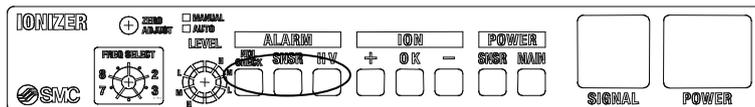
LED name		Function
POWER	MAIN	Indicate that the power is supplied. (Dark green-lighting) (Flashes when the power supply voltage is irregular.)
	SNSR	Goes off

- ION LED: Indicates the polarity of the discharge ion.



LED name		Function
ION	+	Indicates that the ionizer discharges positive ions (Orange-lighting)
	OK	Goes off
	-	Indicates that the ionizer discharges negative ions (Blue-lighting)

- ALARM LED: Indicates the abnormal states of the ionizer.



LED		Function
ALARM	HV	Indicate that abnormal current flows to the emitter. (Red-lighting)
	SNSR	Goes off
	NDL CHECK	Goes off

(7) Alarm

Alarms	Details	How to reset
High voltage error	Gives notification of the occurrence of an abnormal current such as high-voltage leakage. The ionizer stops ion emission, turns on the HV ALARM indicator, and the error signal (OUT3) is turned OFF.	Turn OFF the power supply, solve the problem, and then turn the power supply on again. Alternatively turn the discharge stop signal (IN1) OFF then ON.
CPU error	Gives notification of the occurrence of a failure in the CPU due to noise, etc. The ionizer stops ion emission, all of the LED indicators flash, and the error signal (OUT3) is turned OFF.	Turn OFF the power supply, solve the problem, and then turn the power supply on again. Alternatively turn the discharge stop signal (IN1) OFF then ON.

(8) Timing chart

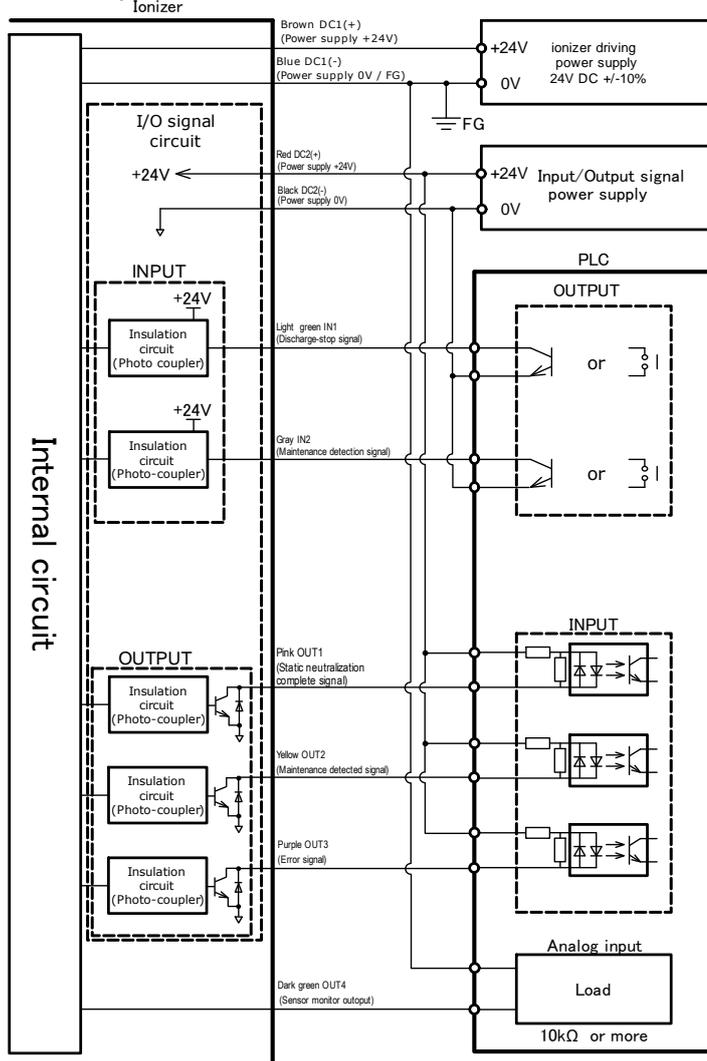
- Timing chart of normal operation

		Normal operation	Reset operation	Remarks
24V DC power supply	Input	ON	OFF	Turn the power off to solve the problem, then supply power again. The error signal(OUT3) will be reset.
	OFF	ON	OFF	
Discharge stop signal (IN1)	Input	ON	OFF	* The error signal(OUT3) can be reset by the discharge stop signal (IN1) to OFF and ON
	OFF	ON	OFF	
State of ion emission	ON	ON	OFF	Turned ON in normal operation Turned OFF in case of various error
	OFF	OFF	ON	
Error signal (OUT3)	Output	ON	OFF	
	OFF	OFF	ON	

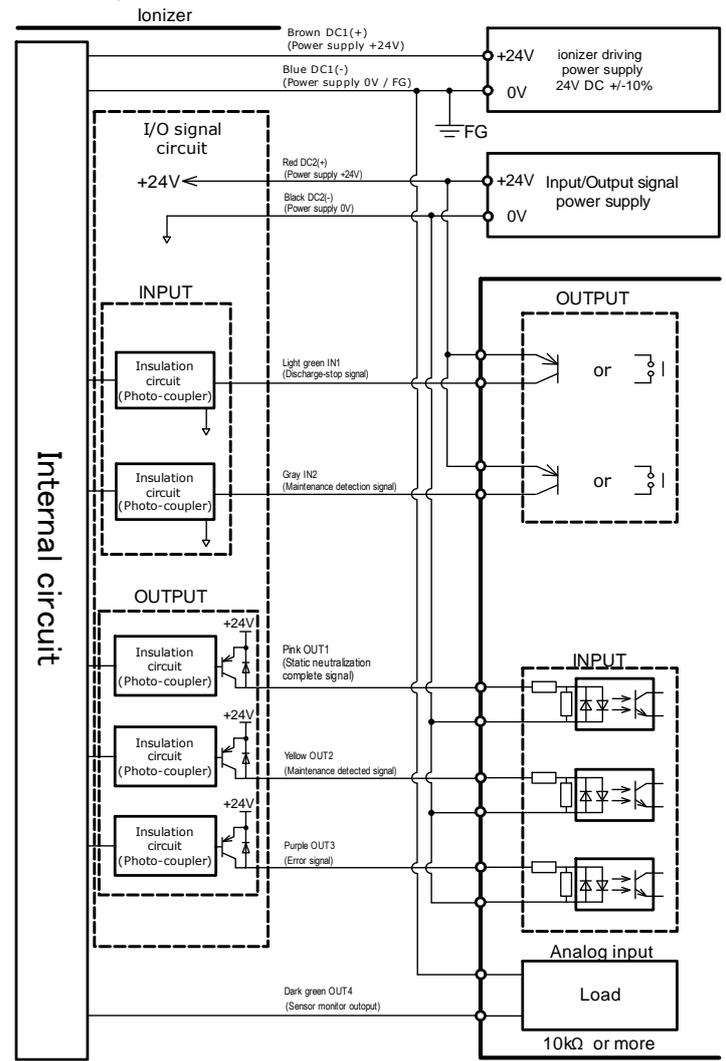
3-4. Power supply cable wiring diagram

(1) With no sensor, with feedback sensor, or with auto balance sensor [High-precision type]

● NPN specification



● PNP specification



Note) Make sure to ground FG of the power supply 0V and DC1(-) lead wire [blue] of the power supply cable for driving ionizer with the ground resistance of 100 ohms or less. Output signals (OUT1 to OUT3) are isolated from FG with an isolation circuit (optically isolated output), but the sensor monitor output* (OUT4: Dark green) is not isolated.

* The measured potential of the Feedback sensor is output as an analog output when Feedback sensor is used. The measured potential is not output when an auto balance sensor is used.

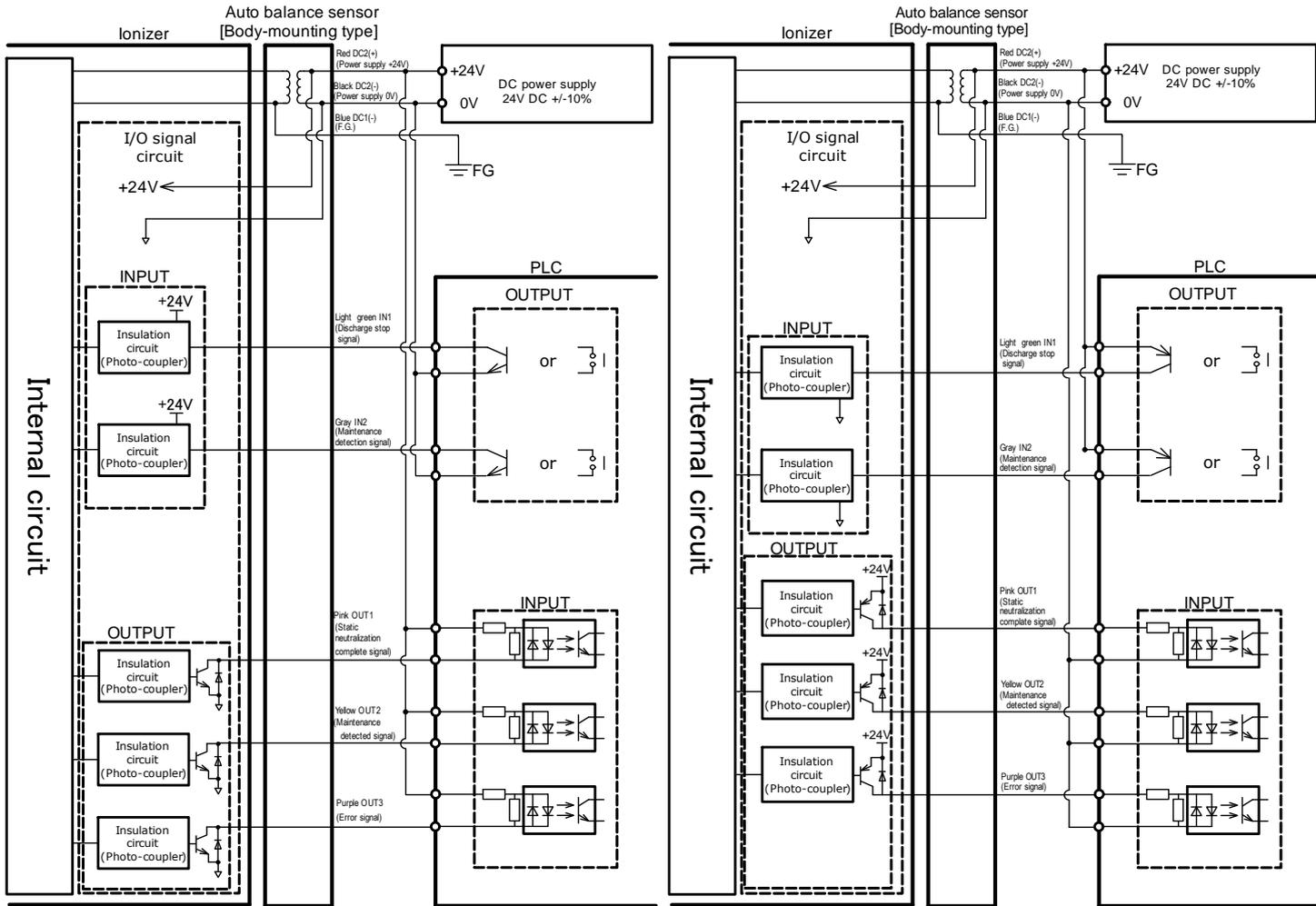
The power supply cable for operation DC1 and the power supply cable for I/O signal DC2 can be connected to the common power supply.

When they are used with the common power supply, the DC1(-) [FG] which is grounded and the I/O signal line are all not isolated.

(2) With auto balance sensor [Body-mounting type]

● NPN specification

● PNP specification



* Make sure to ground the DC(-)[Blue] with the ground resistance of 100 ohms or less directly. Not necessary to connect the power supply GND. If connecting with GND, All I/O signal lines are not isolated from FG.

4. Specifications

4-1. Ionizer

Model number		IZS31 (NPN specification)	IZS31P (PNP specification)
Ion generating method		Corona discharge type	
Method of applying voltage		Sensing DC, Pulse DC, DC	
Discharge output		+/-7000 V	
Offset voltage ^{*1}		+/-30 V (+/-100 V for stainless steel emitter)	
Air purge	Fluid	Air (Clean dry air)	
	Operating pressure	0.7 MPa or less	
	Connecting tube O.D.	4mm	
Power supply voltage		24VDC +/-10%	
Current consumption	Sensing DC mode	200 mA or less (Waiting: 120 mA or less)	
	Pulse DC mode	Auto balance sensor [High accuracy type]: 200 mA or less Auto balance sensor [Body mounting type]: 300 mA or less With no sensor: 170 mA or less	
	DC mode	170 mA or less	
Input signal	Discharge stop signal	Connected to GND Voltage range: 5 VDC or less Current consumption: 5 mA or less	Connected to +24 V Voltage range: 19 VDC to power supply voltage Current consumption: 5 mA or less
	Maintenance detection signal		
Output signal	Static neutralization complete signal	Maximum load current: 100 mA Residual voltage: 1 V or less (Load current at 100 mA) Maximum applied voltage: 28 VDC	Maximum load current: 100 mA Residual voltage: 1V or less (Load current at 100 mA)
	Maintenance detected signal		
	Error signal		
	Sensor monitor output ^{*2}	Voltage output: 1 to 5 V (Connect a load more than 10 kΩ)	
Effective static neutralizing distance		50 to 2000 mm (Sensing DC mode: 200 to 2000 mm)	
Ambient temperature, Fluid temperature		0 to 50°C	
Ambient humidity		35 to 80% Rh (With no condensation)	
Material		Body cover: ABS Emitter: Tungsten, single crystal silicon, stainless steel	
Vibration resistance		Endurance: 50Hz, Amplitude: 1 mm, 2 hours to each direction (X, Y, Z)	
Impact resistance		10 G	
Standard/Directive		CE (EMC Directive:2004/108/EC) UL (U.S. Standard for Electrostatic Air Cleaners,UL867, fourth edition) CSA (Canadian Standard for Electrostatic Air Cleaners, CAN/CSA C22.2 No.187-M1986)	

*1: When the air purge is performed between a charged object and an ionizer at a distance of 300 mm.

*2: When measuring the electric potential of the charged object with the Feedback sensor, the relationship between the charged electric potential to be measured and the sensor monitor output voltage; and the detection range of the sensor are different depending on the sensor installing distance.

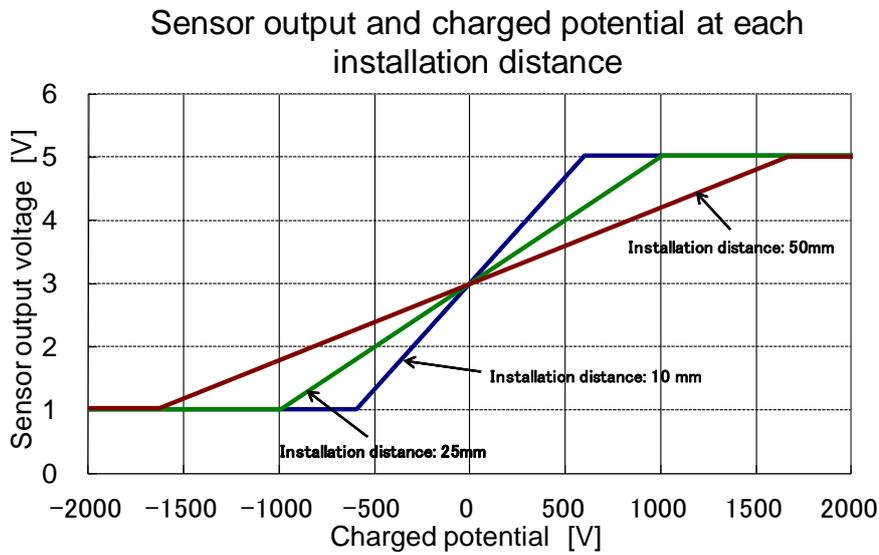
[Number of emitter cartridges/Bar weight]

Bar length (mm)	300	380	620	780	1100	1260	1500	1900	2300
Number of emitter cartridges	3	4	7	9	13	15	18	23	28
Weight (g)	330	400	600	720	1000	1100	1500	2000	2500

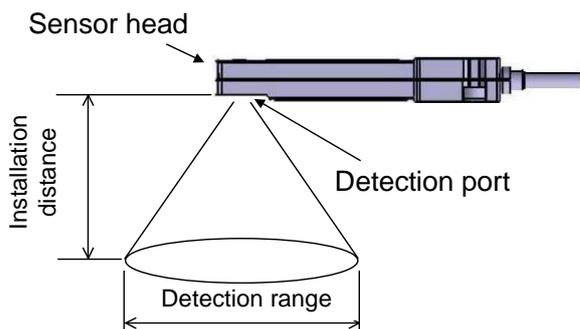
4-2. External Sensor

Sensor model	IZS31-DF Feed back sensor	IZS31-DG Auto balance sensor [High-precision type]	IZS31-DE Auto balance sensor [Body-mounting type]
Ambient temperature	0 to 50°C		
Ambient humidity	35 to 80% Rh (with no condensation)		
Case material	ABS	ABS, Stainless steel	ABS
Vibration resistance	Endurance: 50Hz, Amplitude: 1 mm, 2 hours to each direction (X, Y, Z)		
Impact resistance	10 G		
Weight	200g (including cable weight)	220g (including cable weight)	110g (including cable weight)
Installation distance	10 to 50 mm	-	
Standard/Directive	CE (EMC Directive:2004/108/EC)		

Sensor monitor output (with Feedback sensor)



Detection range of the Feedback sensor



Installation distance (mm)	Detection range (mm)
10	45
25	100
50	180

Revision history

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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