Document No. IZ-OMP0064* C

Operation Manual

Product

Ionizer

Model/Series

IZS4* Series

SMC Corporation

Contents

Bar Type Ionizer
Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions are categorized into three groups, "Caution", "Warning" and "Danger" depending on the level of hazard and damage, and the degree of emergency. They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC), Japan Industrial Standards (JIS)[*1)] and other safety regulations[*2)].

*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems
ISO 4413: Hydraulic fluid power -- General rules relating to systems
IEC 60204-1: Safety of machinery -- Electrical equipment of machines (Part 1: General requirements)
ISO 10218-1992: Manipulating industrial robots -- Safety
JIS B 8370: Pneumatic fluid power - General rules relating to systems
JIS B 8361: Hydraulic fluid power - General rules relating to systems
JIS B 9960-1: Safety of machinery - Electrical equipment of machines (Part 1: General requirements)
JIS B 8433-1993: Manipulating industrial robots - Safety, etc

*2) Labor Safety and Sanitation Law, etc.

Caution	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
Warning	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Danger	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠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 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 dropping of driven objects or run-away of machinery/equipment has 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 used outdoors or in a location exposed to direct sunlight.
2. Installation of 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. Check the product regularly in order to confirm normal operation.

Bar Type Ionizer
Safety Instructions

⚠Caution

The product is provided for use in manufacturing industries.
The product herein described is basically provided for use in manufacturing industries.
If the product is being considered for use 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 within 1.5 years after the product is delivered.*
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

*** 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.

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 the SMC 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.

[Compliance Requirements]

When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).

Selection

⚠Warning

1) These products are intended for use in general factory automation equipment.

Consult SMC before hand when using this product for other intentions (See Warning No. 4 on page 4.

2) Use within the specified voltage and temperature range.

Operation with a voltage other than that specified can cause malfunction, damage to the product, electric shock or fire.

3) Use clean compressed air as fluid. (Air quality Class 2.6.3 specified in ISO 8573-1: 2001 is recommended.)

Never use flammable or explosive gas as fluid. This may lead to fire or explosion. If fluid other than compressed air is used, consult SMC.

4) The product is not designed to be explosion proof.

Never use in an atmosphere of potential dust explosion, flammable gas or explosive gas. It may cause fire.

⚠Caution

1) Clean specification is not available with this product.

This product has not been cleaned. When using this product in a clean room environment, flush and confirm the product's purification level before use. A minute amount of particles are generated due to wearing of the electrodes while the ionizer is operating.

Installation

⚠Warning

1) Secure enough space for maintenance, inspection and wiring.

When routing cables and tubings, secure sufficient maintenance space for the installation and removal of connector and One-touch fitting.

Consider the minimum bending radius of the cables and tubings and avoid bending them at an acute angle so that unreasonable stress is not applied to the mounting parts of the connectors and One-touch fittings. Position the connectors and One-touch fittings as close as possible.

Routing of the wiring and cables in unreasonable positions may cause malfunction, broken cables, and fire.

[Minimum bending radius] Power supply cable: 38mm Transition wiring cable: 38mm
Sensor cable: 25mm

Note: This is the minimum bend radius at 20°C. If the installation is at a lower temperature, the radium will be higher. When the cables are bent at a lower temperature than 20 °C, it may cause unreasonable force to be applied to the connectors.
Refer to the tubing operation manual for minimum bending radius of tubing.

2) Mount to a flat surface.

Mounting on an uneven surface will apply excessive force to the housing and bracket, which may lead to damage or failure. Do not drop the product or subject it to a strong impact. This may cause an injury or accident.

3) Install the product so that the entire bar does not have an excessive deflection.

For a bar length of 820mm or more, support the bar at both ends and in the middle by using brackets (IZS40-BM). If the bar is held only at the both ends, self-weight of the bar causes deflection, resulting in damage to the bar.

4) Avoid using in a place where noise (electromagnetic wave and surge) is generated.

It may cause malfunction, deterioration or damage to internal components. Take measures to prevent noise at its source and avoid power and signal lines from coming into close contact.

5) Use a correct tightening torque.

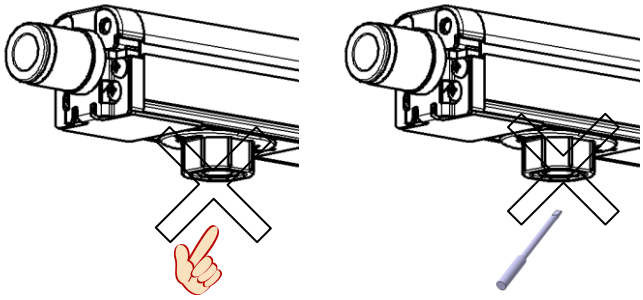
If the screws are tightened in excessive of the specified torque range, it may damage the mounting screws, mounting brackets, etc. If the tightening torque is insufficient, the mounting screws and brackets may become loose.

6) Do not directly touch the electrodes with your finger or tools.

Do not directly touch the electrode with your finger. If the electrode sticks to your finger, or electrical shock makes an instantaneous rapid body motion to escape from the shock, your body may touch the equipment around you, causing injury. If electrode or cartridge is damaged by tools, etc., it may interfere with the specified function and performance, and may also cause operation failure and accident.

High voltage caution

High voltage is applied to the electrodes. Never touch the electrodes. Inserting foreign matter into the cartridge or touching electrode may cause electrical shock and instantaneous rapid body motion to escape from the shock. Your body may then touch the equipment around you, causing injury.



7) Do not adhere tape or sticker onto the product body.

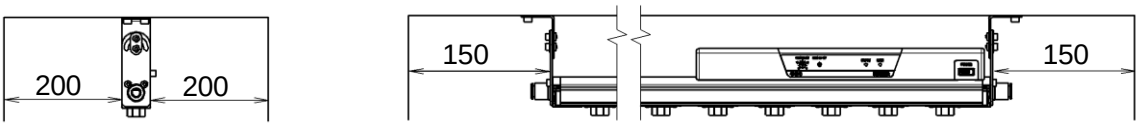
If the tape or sticker contains conductive adhesive or reflective paint, it is possible that due to the dielectric effect, charge could build up causing an electro-static discharge or electrical leakage.

8) Be sure to remove power supply and air supply to the product before starting the product installation.

⚠Caution

1) Install the IZS4∗ series ionizer maintaining distance from a wall, etc. as shown in the Fig. below.

When there is a wall or an object within the area shown in the Fig. below, generated ions may not reach the workpiece effectively, resulting in deterioration of efficiency.



Unit: mm

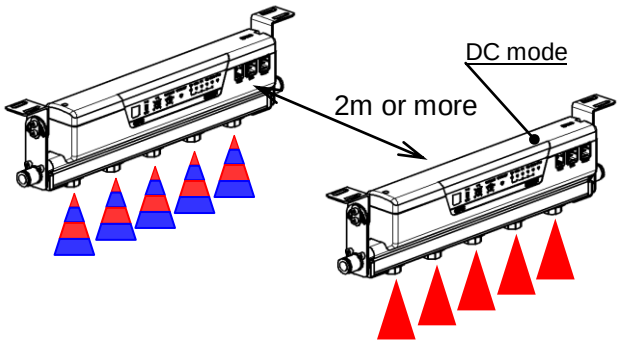
2) Make sure to confirm the effect of de-ionization after installation.

The effect of the ionizer varies depending on the surrounding installation and operating conditions. Confirm the effect of static electricity elimination after installation.

3) When installing IZS41 or IZS42 in proximity with an ionizer which operates in DC mode, they should be positioned at least 2 meters away from each other.

When IZS41 or IZS42 is used close to an ionizer which operates in DC mode, separate the ionizers at least 2 meters.

Ion balance may not be adjusted by the internal sensor due to the ions which are discharged from the DC mode ionizer.



Wiring and Piping

⚠Warning

1) Ensure that the power supply capacity is large enough, and that voltage is within specification before wiring.

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

3) To maintain the product performance, ground the product with an earth ground cable with a resistance of 100 ohm or less according to this manual.

4) Remove the power supply before wiring (including the connector plug in/out).

5) Use a cable with sensor for connection of the ionizer, feedback sensor or auto balance sensor (high accuracy type), and do NOT disassemble or retrofit.
6) Ensure the safety of wiring and surrounding conditions before supplying power.
7) Do not connect or disconnect the connectors (including power source) while the power is being supplied. The ionizer may malfunction.
8) Malfunctions induced by noise may occur if the wire is installed in the same route as that of power or high-voltage cable. Wire the ionizer independently.
9) Confirm that there is no error in wiring before operation. Incorrect wiring will lead to a malfunction or breakage of the product.
10) Flush the piping before connecting. Verify that all dust, moisture, oil, etc. are eliminated from the piping before connecting.

Operating and Storage Environment

⚠Warning

1) Operate the product in the specified fluid temperature range and ambient temperature range.

Fluid temperature and ambient temperature ranges are; 0 to 40 ^{o}C for ionizer, 0 to 50 ^{o}C for feedback sensor and auto balance sensor (high accuracy type), 0 to 40 ^{o}C for AC adapter, and 0 to 45 ^{o}C for remote controller. Avoid sudden temperature change even within specified temperature range, as it may cause condensation.

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

This product utilizes the corona discharge phenomenon. Although the amount is very small, Ozone and NOx are generated. Do not use in an enclosed space.

This product complies with the maximum allowable concentration of ozone of 0.050 parts per million by volume (ppmv) in a 24-hour period. The Health Canada Guideline 2010 recommends that the maximum exposure limit, based on an averaging time of 8 hours, is 0.020 ppmv or less when tested in a sealed, controlled room approximately 30 m^3.

3) Environments to avoid

Never use or store under the following conditions, as these cause product failure.
a. Areas where ambient temperature exceeds the operating temperature range.
b. Areas Where ambient humidity exceeds the operating humidity range.
c. Areas where abrupt temperature changes may cause condensation.
d. Areas where corrosive gas, flammable gas or other volatile flammable substances are stored.
e. Areas where the product may be exposed to conductive powder such as iron powder or dust, oil mist, salt, organic solvent, machining chips, particles or cutting oil (including water and any liquids), etc.
f. Paths of direct air flow, such as air conditioners.
g. Enclosed or poorly ventilated areas.
h. Locations that are exposed to direct sunlight or heat radiation.
i. Areas where strong electromagnetic noise is generated, such as strong electrical and magnetic fields or supply voltage spikes.
j. Areas where the product is exposed to static electricity discharge.
k. Locations where strong high frequency is generated.
l. Locations that are subject to potential lightning strikes.
m. Areas where the product may be exposed to direct impact or vibration.
n. Areas where the product may be subjected to forces or weight that could cause physical deformation.

4) Do not use air containing mist and/or dust.

Air containing mist and/or dust may cause performance deterioration, and reduce the maintenance cycle.

Install a dryer (IDF series), air filter (AF/AFF series), or mist separator (AFM/AM series) to obtain clean compressed air (air quality of Class 2.6.3 or higher according to ISO 8573-1: 2001 is recommended for operation).

5) Ionizer, feedback sensor, auto balance sensor (high accuracy type), remote controller, and AC adapter are not resistant to lightening surge.

Maintenance and Inspection

⚠Warning

-RISK OF ELECTRIC SHOCK-

These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

High voltage caution

A high voltage generating circuit is mounted onto this product. Make sure to check that the power supply is stopped when performing maintenance. Never disassemble or modify the product, as this can cause loss of product functionality, and there is also a risk of electric shock and earth leakage.

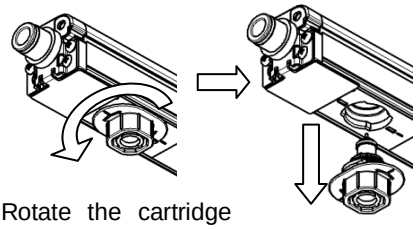
1) Perform maintenance regularly to keep the electrodes clean.

Perform regular maintenance of the product to prevent undetected failures. The maintenance must be carried out by an operator who has sufficient knowledge and experience. If the product is used for an extended period of time with dust is present on the electrodes, the product's ability to eliminate static electricity will be reduced. If the electrodes become worn and the product's ability to eliminate static electricity is not restored after cleaning, replace the cartridge.

2) Make sure to remove power and air supply from the product before cleaning the electrodes or replacing the cartridges.

If the electrodes are touched while the product is energized, this may cause an electric shock or accident.

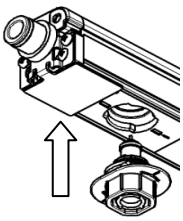
If an attempt to replace the cartridges is performed before removing air supply, the cartridges may eject unexpectedly due to presence of the supply air. Remove air supply before replacing the cartridges. If cartridges are not securely mounted to the bar, they may eject or release when air is supplied to the product. Securely mount or remove the cartridges referencing the instructions shown below.



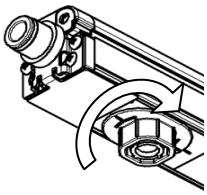
1) Rotate the cartridge 90 degrees in the counter-clockwise direction.

2) Pull to remove.

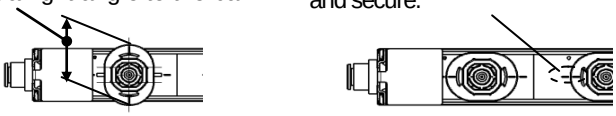
Removal of electrode cartridge



1) Insert the cartridge into the bar so that the longer side of the cartridge is mounted at a right angle to the bar.



2) Rotate the cartridge 90 degrees in the clockwise direction, and match the markings on the bar to those on the cartridge and secure.



Mounting of electrode cartridge

3) Perform contamination detection of the electrode without workpiece. (IZS41 and IZS42)

While electrode detects contamination, ionizer discharges positive ions and negative ions for contamination detection.

4) Do not disassemble or modify the product.

This may lead to accidents such as electric shock, failure, fire or etc. If the product is disassembled and/or modified, the functions and performance in the specifications may not be achieved and the product will not be guaranteed.

5) Do not operate the product with wet hands.

This may cause an electric shock or accident.

Handling

⚠Caution

1) Do not drop, hit or apply excessive shock (100m/s^2 or more) to the product.

Even if the ionizer body is not damaged, the internal components may be damaged, leading to a malfunction.

2) When installing the product, handle the product so that no moment is applied to the controller and the ends of the bar.

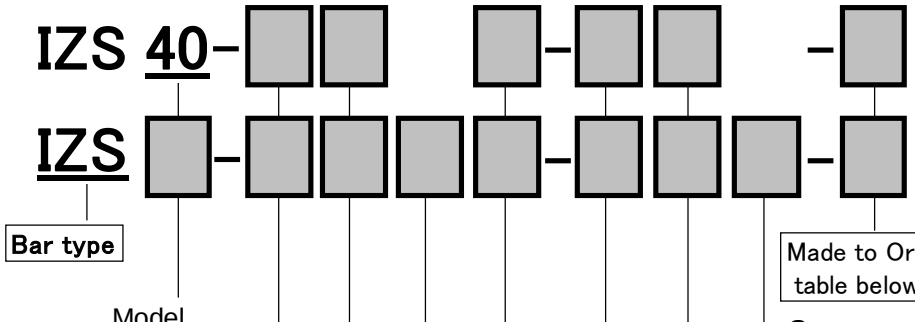
Handling the product by holding either end of the bar may cause damage to the product.

3) When connecting and disconnecting the cables, hold the claws of the plugs together with the plug bodies, and insert or pull out straight.

Connection and removal of the plugs with excessive force may damage the connecting parts and also cause malfunction.

1. How to Order

1-1. Ionizer



Model

40	Standard type
41	Feedback sensor type
42	Dual AC type

Bar length

Symbol	Bar length
340	340mm
400	400mm
460	460mm
580	580mm
640	640mm
820	820mm
1120	1,120mm
1300	1,300mm
1600	1,600mm
1900	1,900mm
2320	2,320mm
2500	2,500mm

Electrode cartridge type/ Electrode material

Symbol	Electrode cartridge type	Electrode material
Nil	High speed de-ionizing cartridge	Tungsten
C		Silicon
J	Energy saving type de-ionizing cartridge	Tungsten
K		Silicon

Input/Output specifications

Nil	NPN
P	PNP

- IZS40: Specify "Nil" as it does not have an output function.
- Input/Output function cannot be used when the AC adapter is being used.

Power supply cable

Nil	With power supply cable (3m)
Z	With power supply cable (10m)
N	Without power supply cable

- When only an e-CON connector for IZS40 is required, specify "N", and order a part (Part No: ZS-28-C) separately.
- To use AC adapter, specify "N", and select AC adapter with the option number. (A cable is attached to the AC adapter)
- Input/Output function cannot be used when the AC adapter is being used.

Sensor

Symbol	Sensor	IZS41	IZS42
Nil	Without sensor	Yes	Yes
F	Feedback sensor	Yes	—
G	Auto balance sensor [high accuracy type]	Yes	Yes

- IZS40: Specify "Nil" as it does not have a sensor connecting function.
- Feedback sensor cannot be used for IZS42.

Bracket

B	With bracket *
Nil	Without bracket

* Number of intermediate bracket depends on the bar length. (See table below)

No of bracket

Symbol for bar length	End bracket	Intermediate bracket
340 ~ 760	2 pcs.	None
820 ~ 1,600		1 pcs.
1,660 ~ 2,380		2 pcs.
2,440 ~ 2,500		3 pcs.

One-touch fitting

06	φ 6 One-touch tube fitting
08	φ 8 One-touch tube fitting
10	φ 10 One-touch tube fitting

Refer to the table below for selection of One-touch fittings.

Recommended piping bore size

	One-touch fitting		
	φ 6	φ 8	φ 10
Recommended max. bar length for single end piping	640	1,300	2,500
Recommended max. bar length for double ends piping	1,300	2,500	2,500

* The ionizer has air supply port at the both ends.

Made to Order

Symbol	Description	Specifications
X10	Non-standard bar length	Symbol for producible bar length: 460 + 60 x n (N: Integer from 1 to 34) (For 2, 3, 6, 11, 14, 19, 24, 31, and 34 for n, use a standard model.)
X14	With electrode cartridge drop preventive cover	An optional electrode cartridge drop preventive cover is mounted to the ionizer as default.

1-2. Accessories

Electrode cartridge

(Common for IZS40, IZS41 and IZS42)

IZS40－N□

Electrode cartridge type/ Electrode material

Symbol	Electrode cartridge type	Electrode material
T	High speed de-ionizing cartridge	Tungsten
C		Silicon
J	Energy saving type de-ionizing cartridge	Tungsten
K		Silicon

Tungsten
(Cartridge color: White)

Silicon
(Cartridge color: Gray)

Power supply cable

IZS□－CP□

Power supply cable length

Nil	Total length 3m
Z	Total length 10m

Model

40	For IZS40
41	For IZS41, IZS42

Made to Order

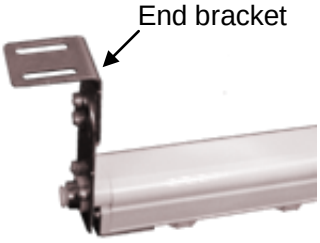
How to Order	Contents/Specifications
IZS□－CP□-X13 機種 40 For IZS40 41 For IZS41, IZS42 Power supply cable length 01 Total length 1m 02 Total length 2m 19 Total length 19m 20 Total length 20m	Made to order power supply cable Available in a unit of 1 meter from 1 to 20m. Note 1) CE not compliant for a cable of 10m or longer. Note 2) For 3m and 10m, use a standard product.

Bracket (Common for IZS40, IZS41 and IZS42)

IZS40－B□

Bracket type

E	End bracket
M	Intermediate bracket



Note) The following table lists a recommendation of the numbers of brackets required for intermediate support based on the bar length.
2 end brackets are necessary regardless of the bar length.

No of bracket

Bar length mm	End bracket	Intermediate bracket
340 ~ 760	2 pcs.	None
820 ~ 1,600		1 pcs.
1,660 ~ 2,380		2 pcs.
2,440 ~ 2,500		3 pcs.

External sensor (Common for IZS41 and IZS42)

IZS31－D□

External sensor

F	Feedback sensor
G	Auto balance sensor [high accuracy type]

Note) External sensor cannot be used for IZS40.
Feedback sensor cannot be used for IZS42.

IZS31-DF

IZS31-DG

1-3. Option

Drop prevention cover (Common for IZS40, IZS41 and IZS42)

IZS40－E□

No. of electrode cartridge to be fixed

3	3 pcs.
4	4 pcs.
5	5 pcs.

Image of the product mounted with the cover

Standard bar length

Symbol for bar length	No. of drop prevention cover needed		
	IZS40-E3	IZS40-E4	IZS40-E5
340			1
400	2		
460	1	1	
580		1	1
640			2
820	1		2
1120	1		3
1300	2		3
1600	2		4
1900	2		5
2320	1		7
2500	2		7

Non-standard bar length

Symbol for bar length	No. of drop prevention cover needed		
	IZS40-E3	IZS40-E4	IZS40-E5
520	1		1
700	2		1
760	1	1	1
880		1	2
940			3
1000	2		2
1060	1	1	2
1180		1	3
1240			4
1360	1	1	3
1420	1		4
1480		1	4

Non-standard bar length

Symbol for bar length	No. of drop prevention cover needed		
	IZS40-E3	IZS40-E4	IZS40-E5
1540			5
1660	1	1	4
1720	1		5
1780		1	5
1840			6
1960	1	1	5
2020	1		6
2080		1	6
2140			7
2200	2		6
2260	1	1	6
2380		1	7
2440			8

AC adapter

AC adapter **for IZS40**

IZF10－C□

AC adapter

G1	AC adapter (AC cord attached)
G2	AC adapter (Without AC cord)

Note) AC cord is only for use in Japan. (Rated voltage 125V, plug JIS C8303, inlet IEC60320-C8)

AC adapter **for IZS41 and IZS42**

IZS41－C□

AC adapter

G1	AC adapter (AC cord attached)
G2	AC adapter (Without AC cord)

Note) AC cord is only for use in Japan. (Rated voltage 125V, plug JIS C8303, inlet IEC60320-C8)
External input and output cannot be used when the AC adapter is being used.

AC adapter

AC cord

Transition wiring cable (Common for IZS41 and IZS42)

IZS41－CF□

Transition wiring cable

02	Total length 2m
05	Total length 5m
08	Total length 8m

Note) Transition wiring is not possible for IZS40

Made to Order

How to Order	Contents/Specifications
IZS41－CF□-X13 Transition wiring cable length 01 Total length 2m 03 Total length 3m 19 Total length 19m 20 Total length 20m	Made to order transition wiring cable Available in a unit of 1 meter from 1 to 20m. Note 1) CE not compliant for a cable of 10m or longer. Note 2) For 2m, 5m, and 8m, use a standard product. Note 3) Transition wiring is not possible for IZS40.

Remote controller (Common for IZS41 and IZS42)

IZS41－RC

Note) Remote controller cannot be used for IZS40.
(Batteries are not supplied.)
(2pcs. of AA A sized battery)

e-con connector (IZS40)
Connector used for IZS40.

ZS-28-C

Electrode cleaning kit
(Common for IZS40, IZS41 and IZS42)

IZS30－M2

2. Installation

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

The effect of the ionizer varies depending on the surrounding installation and operating conditions. Confirm the effect of static electricity elimination after installation. (The same applies when the ionizer is moved and installed in a different location.)

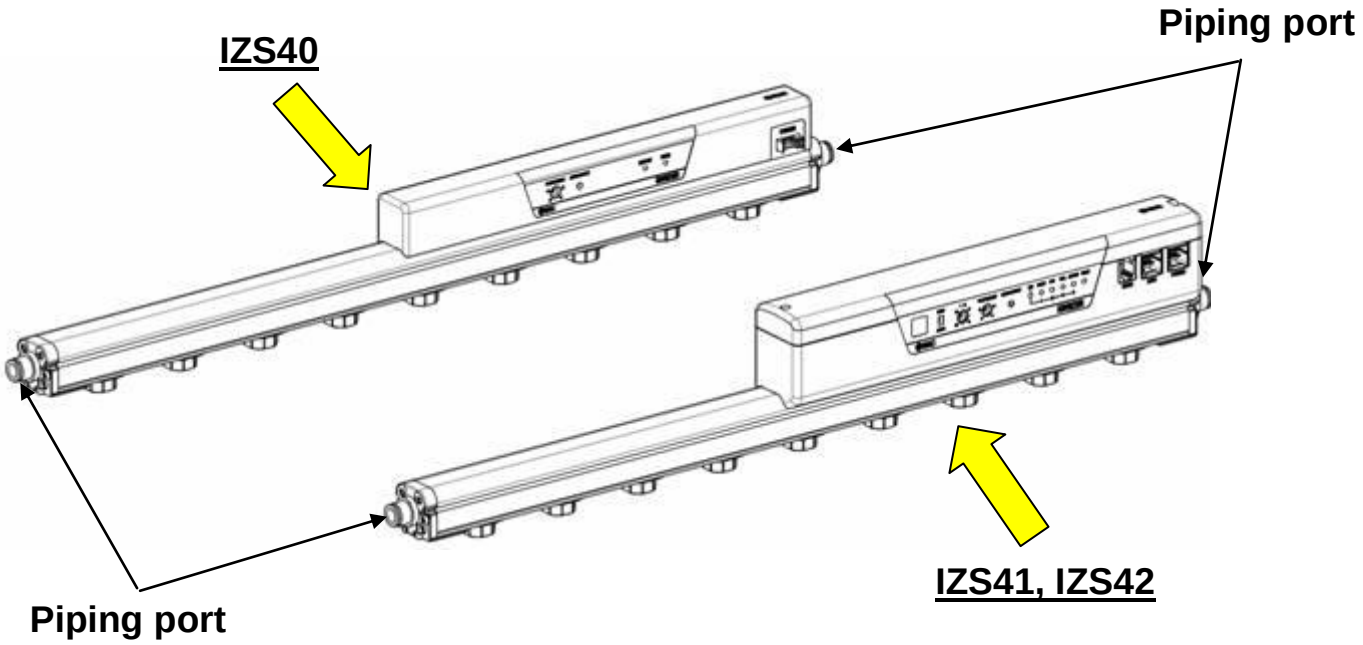
2-1. Installation of ionizer

2-1-1. Selection of piping port size

When using the air purge function, ionizer piping port size should be selected depending on the bar length according to the ranges specified in the table below..

One-touch fittings are mounted to the piping ports of the ionizer at both ends of the bar. Connect piping for air supply through the One-touch fitting(s) either to one end or both ends, depending on the bar length.

If the ionizer is used outside of the specified range, de-ionizing performance may be deteriorated.



One-touch fitting selection (Standard bar length)

Symbol for One-touch fitting	Applicable tube O.D. (mm)	Symbol for bar length											
		340	400	460	580	640	820	1120	1300	1600	1900	2320	2500
06	φ 6	○	○	○	○	○	●	●	●				
08	φ 8						○	○	○	●	●	●	●
10	φ 10									○	○	○	○

○: With piping on one side
●: With piping on both sides

One-touch fitting selection (Non-standard bar length)

Symbol for One-touch	Applicable tube O.D.	Symbol for bar length		
		340～640	700～1300	1360～2500
06	φ 6	○	●	
08	φ 8		○	●
10	φ 10			○

○: With piping on one side
●: With piping on both sides

2-1-2. Distance for installation

Install the ionizer with the distance from the workpiece to be de-ionized within the ranges specified in the table below.

	Model	Distance from the ionizer to the de-ionized workpiece (mm)	Sensor installation distance
When the external sensor is not used	IZS40 IZS41 IZS42	50 to 2,000	—
When the feedback sensor is used	IZS41	200 to 2,000	Distance between de-ionized workpiece and ionizer 10 to 50mm
When auto balance sensor (high accuracy type) is used	IZS41 IZS42	100 to 2,000	Distance between the ionizer and sensor 100 to 2000mm

Ion generation frequency Hz	Distance from the ionizer to the de-ionized workpiece (mm)								
	IZS40			IZS41			IZS42		
	Without air purge	With air purge		Without air purge	With air purge		Without air purge	With air purge	
		Energy saving type de-ionizing cartridge	High speed de-ionizing cartridge		Energy saving type de-ionizing cartridge	High speed de-ionizing cartridge		Energy saving type de-ionizing cartridge	High speed de-ionizing cartridge
0.1	-	-	-	-	-	-	100 ~ 175	50 ~ 2,000	50 ~ 2,000
0.5	-	-	-	-	-	-	100 ~ 175	50 ~ 2,000	50 ~ 2,000
1	300 ~ 500	400 ~ 2,000	600 ~ 2,000	300 ~ 500	400 ~ 2,000	600 ~ 2,000	100 ~ 175	50 ~ 2,000	50 ~ 2,000
3	300 ~ 400	350 ~ 2,000	500 ~ 2,000	300 ~ 400	350 ~ 2,000	500 ~ 2,000	75 ~ 150	50 ~ 2,000	50 ~ 2,000
5	300 ~ 400	300 ~ 2,000	400 ~ 2,000	300 ~ 400	300 ~ 2,000	400 ~ 2,000	75 ~ 150	50 ~ 2,000	50 ~ 2,000
8	300 ~ 350	250 ~ 2,000	300 ~ 2,000	-	-	-	-	-	-
10	200 ~ 300	200 ~ 2,000	200 ~ 2,000	200 ~ 300	200 ~ 2,000	200 ~ 2,000	75 ~ 150	50 ~ 2,000	50 ~ 2,000
15	200 ~ 300	150 ~ 2,000	100 ~ 2,000	200 ~ 300	150 ~ 2,000	100 ~ 2,000	50 ~ 125	50 ~ 2,000	50 ~ 2,000
20	150 ~ 250	100 ~ 2,000	50 ~ 2,000	150 ~ 250	100 ~ 2,000	50 ~ 2,000	50 ~ 125	50 ~ 2,000	50 ~ 2,000
30	50 ~ 200	50 ~ 2,000	50 ~ 2,000	50 ~ 200	50 ~ 2,000	50 ~ 2,000	50 ~ 125	50 ~ 2,000	50 ~ 2,000

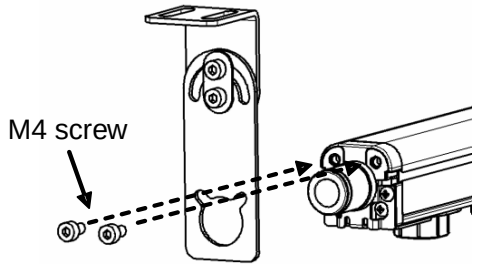
Note) The above mentioned distances are guidelines for installation of the ionizer. Confirm the de-ionizing effect before installing.
Minimum installation height of the ionizer when using a feedback sensor (for IZS41) should be 200mm. Minimum installation height of the ionizer when using an auto balance sensor (high accuracy type, for IZS41 and IZS42) should be 100mm. When operating the product outside of these conditions, confirm the proper operation of the sensor.

2-1-3. Mounting and installation of the bracket

1) End bracket

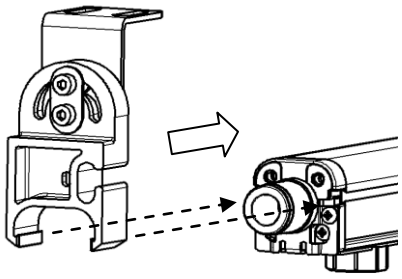
Mount an end bracket to both ends of the ionizer body using the M4 screws supplied as accessories.

Tightening torque: 1.3 to 1.5Nm



2) Intermediate bracket (for bar lengths of 820mm or more)

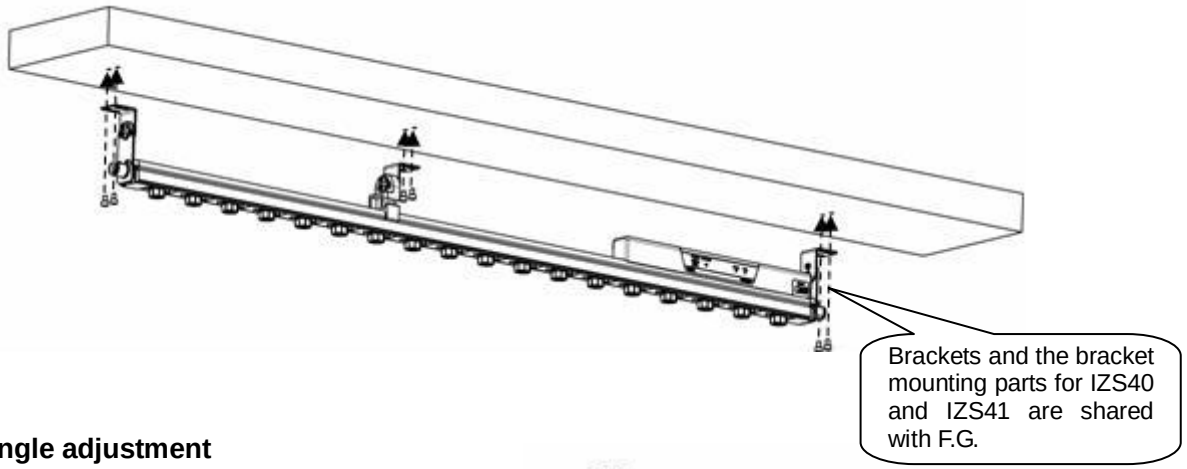
Match the groove of the ionizer body and protrusion of the intermediate bracket, and slide the bracket from the end of the ionizer body. Intermediate brackets should be mounted at the same intervals.



3) Installation of the ionizer (when using brackets)

Tap (M5) screws at the bracket mounting positions for installation of the ionizer and fix the ionizer body and brackets with M5 screws.

IZS40 and IZS41 are constructed such that the brackets at the bracket mounting positions on both ends of the bar are shared with F.G. Use caution to avoid short-circuit with the +24V power supply when installing and supplying power.

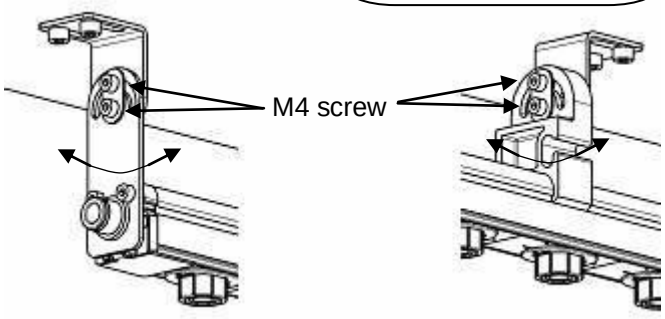


4) Mounting angle adjustment

Adjust the angle of the ionizer body for effective de-ionizing and fix the ionizer with the rotating set screw (M4) at each bracket.

End bracket tightening torque: 1.3 to 1.5 Nm

Intermediate bracket tightening torque: 0.73 to 0.75Nm



End bracket

Intermediate bracket

2-2. Installation of the external sensor

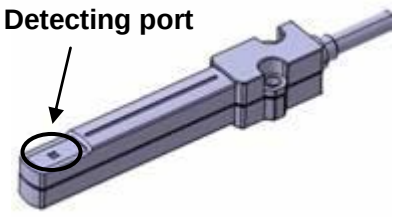
Feedback sensor and auto balance sensor (high accuracy type) are available for the external sensor.
External sensor cannot be used for some ionizer models.

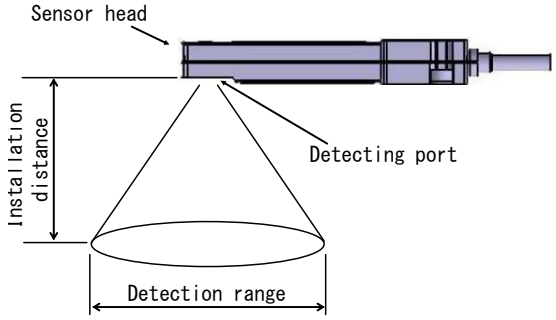
IZS40: No external sensor shall be used.
IZS41: Feedback sensor and auto balance sensor (high accuracy type) may be used.
IZS42: Auto balance sensor (high accuracy type) may be used.

1) Installation of sensor head

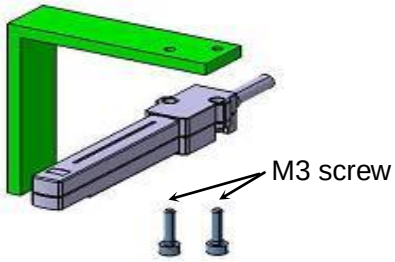
<Feedback sensor>

Install the product in a place where the detection hole of the sensor head will aim at the workpiece. Distance from the detection hole and surface of the workpiece is recommended to be 10 to 50mm. The sensor head should be installed at a distance that prevents static electricity from being discharged over the sensor head. (Sensor head may be damaged if static electricity is discharged over the sensor head.) Also, the ionizer should be installed in a location where it will not be in contact with the workpiece. Detection area depends on the installation distance.





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



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

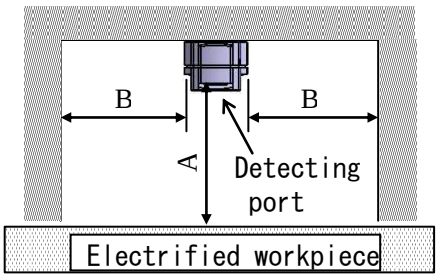
The sensor structure has a sensor head case shared with GND. Use caution to avoid short circuit +24V power supply when installing and/or supplying power.

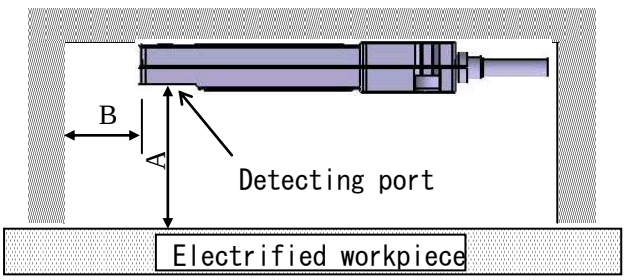
The detecting port is open to detect static electricity. If foreign matter, etc. enters the port or the hole touches a tool, damage to or malfunction of the sensor may be caused disabling correct detection of static electricity. Attention should be paid to prevent foreign matters from entering the port or the inside of the tool being touched.

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

When installing a feedback sensor, keep the sensor away from walls, etc.

The charge potential may not be detected correctly if anything such as a wall exists around the sensor.





Unit: mm

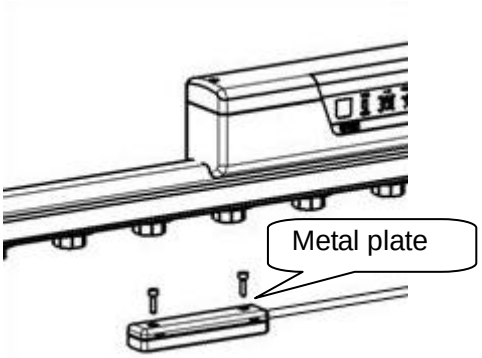
A	B
10	20
20	40
25	45
30	55
40	65
50	75

<Auto balance sensor (high accuracy type)>

Mount a metal plate directly beneath the ionizer so that the metal plate faces the ionizer. Ion balance may vary depending on the installation environment. Install the auto balance sensor at the same level as the workpiece. The recommended distance between the auto balance sensor (high accuracy type) and the ionizer is 100 to 2000mm.

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

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

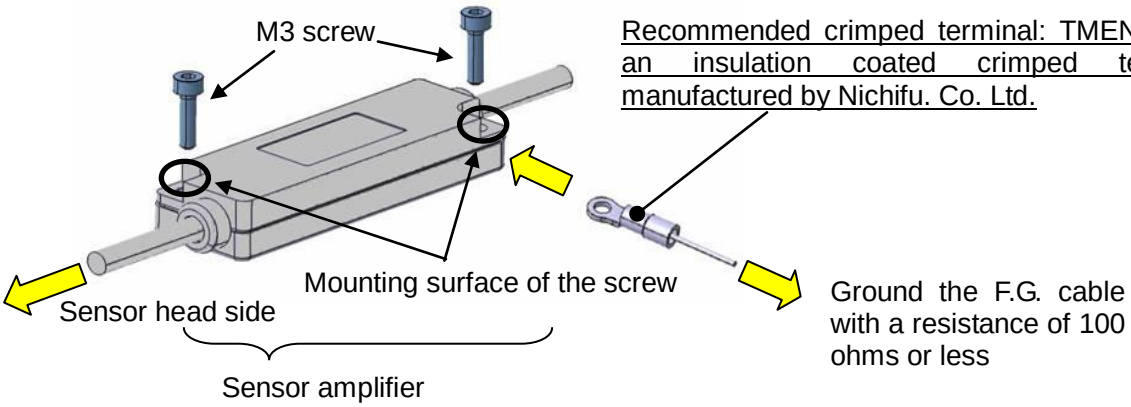


2) Installation of sensor amplifier

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 breakage or wire breakage.

Be certain to ground the sensor amplifier case with a resistance of 100 ohms or less. As the external surface of the sensor amplifier case is plated with conductive substance, F.G. wiring is not necessary if the sensor amplifier is mounted to equipment which is grounded with a resistance of 100 ohms or less. When the mounting surface is insulated with painting or insulation process, etc., connect wiring and make sure to **ground with a resistance of 100 ohms or less.**



2-3. Routing of cables

Consider the minimum bending radius of the cables and avoid bending the cables at an acute angle to eliminate unreasonable Stress to the mounting parts of the connectors. Position the cables within close proximity of each other to prevent undue stress.

[Minimum bending radius] Power supply cable: 38mm Transition wiring cable: 38mm
Sensor cable: 25mm

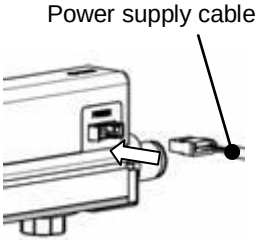
Note) This is the minimum bend radius at 20°C. If the installation is at a lower temperature, the radium will be higher. When the cables are bent at a lower temperature than 20 °C, it may cause unreasonable force to be applied to the connectors.

1) Power supply cable

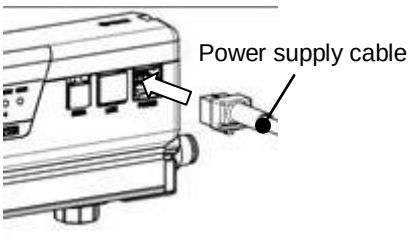
This cable supplies power to the ionizer and external equipment used to control the ionizer. (IZS40 has no input/output functions.)

Insert the plug of the power supply cable into the modular jack indicated with "POWER".

When connecting and disconnecting the power supply cable, hold the claws of the plugs together with the plug bodies, and insert or pull out straight. Connection and removal of the plugs with excessive force may damage the connecting parts and possibly cause malfunction.



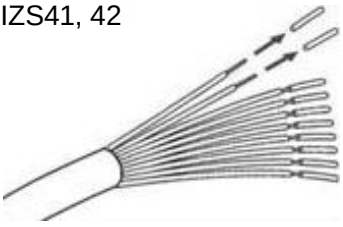
IZS40



IZS41, 42

Hold the cable with a tie-band at a position close to the joint to avoid applying unreasonable force to the plug.

Connect the lead wires according to the wiring diagram. Unused wires should be cut short or insulated using plastic tape.



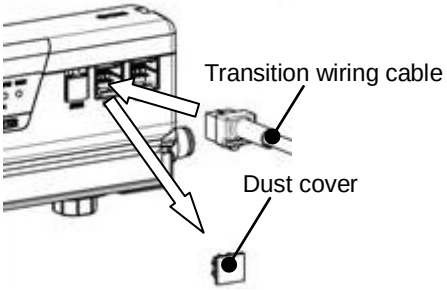
2) Transition wiring cable (Transition wiring is not possible with IZS40.)

This cable is used for connection between ionizers.

When connecting and disconnecting the transition wiring cables, hold the claws of the plugs together with the plug bodies, and insert or pull out straight. Connection and removal of the plugs with excessive force may damage the connecting parts and also cause malfunction.

For transition wiring, connect the "LINK" connector on the ionizer side, to which power is supplied, to the "POWER" connector of the ionizer to be added with the transition wiring cable.

The "LINK" connector has a dust cover. Remove this cover before connecting the cable. Refer to the Chapter 2-4," Transition wiring of ionizer" for details.

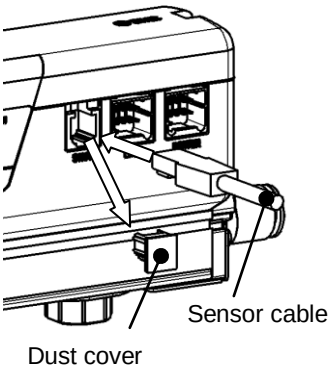


3) Sensor cable (Sensor may not be connected to IZS40)

When connecting a feedback sensor (connectable to IZS41) or auto balance sensor (high accuracy type, connectable to IZS41 and IZS42), remove the dust cover of the modular jack labeled "SNSR", and insert the modular plug of the 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 unreasonable force being applied to the modular jack and plug.

When connecting and disconnecting the sensor cable, hold the claws of the plugs together with the plug bodies, and insert or pull out straight. Connection and removal of the plugs with excessive force may damage the connecting parts and also cause malfunction.



2-4. Transition wiring of ionizer

For transition wiring of ionizers, use a transition wiring cable for connection between ionizers. Use a power supply cable for connection between ionizer and power supply or external equipment. (Transition wiring is not possible with IZS40.)

The number of ionizers that may be connected using transition wiring varies depending on the power supply cable; the length of the transition wiring cable; the use of external sensor(s) and/or models. Refer to the table shown below "Connectable number of ionizers with transition wiring".

IZS41 and IZS42 can be connected in the same transition wiring, but mixed wiring of the NPN and PNP I/O specifications is not possible.

Contact SMC when connecting conditions other than specified in the table below are applied.

No. of IZS41 ionizers connectible in a transition wiring (without external sensor)

Symbol for bar length	Power supply cable length: 3m Transition wiring cable length (same cable length) m										Power supply cable length: 10m Transition wiring cable length (same cable length) m									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
340												7pcs.								
400													6pcs.							
460				7pcs.																
580											8pcs.									
640																				
820	8pcs.						5pcs.			4pcs.				5pcs.				4pcs.		
1120																				
1300				6pcs.								6pcs.								
1600			7pcs.																	
1900											7pcs.									
2320																				3pcs.
2500																				

No. of IZS42 ionizers connectible in a transition wiring (without external sensor)

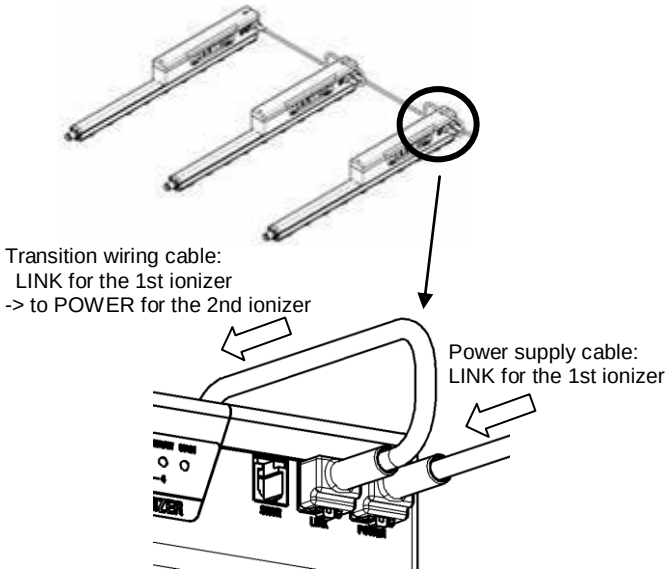
Symbol for bar length	Power supply cable length: 3m Transition wiring cable length (same cable length) m										Power supply cable length: 10m Transition wiring cable length (same cable length) m									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
340																				
400																				
460																				
580																				
640																				
820		5pcs.						4pcs.				5pcs.		4pcs.				3pcs.		
1120																				
1300																				
1600																				
1900																				
2320																				
2500									3pcs.											

It is recommended that the power supply used to operate the ionizers have a current capacity twice that of the total current consumption of the ionizers to be used. Power supply voltage should be from 24 to 26.4 VDC.

AC adapter must not be used when ionizer is used in a transition wiring.

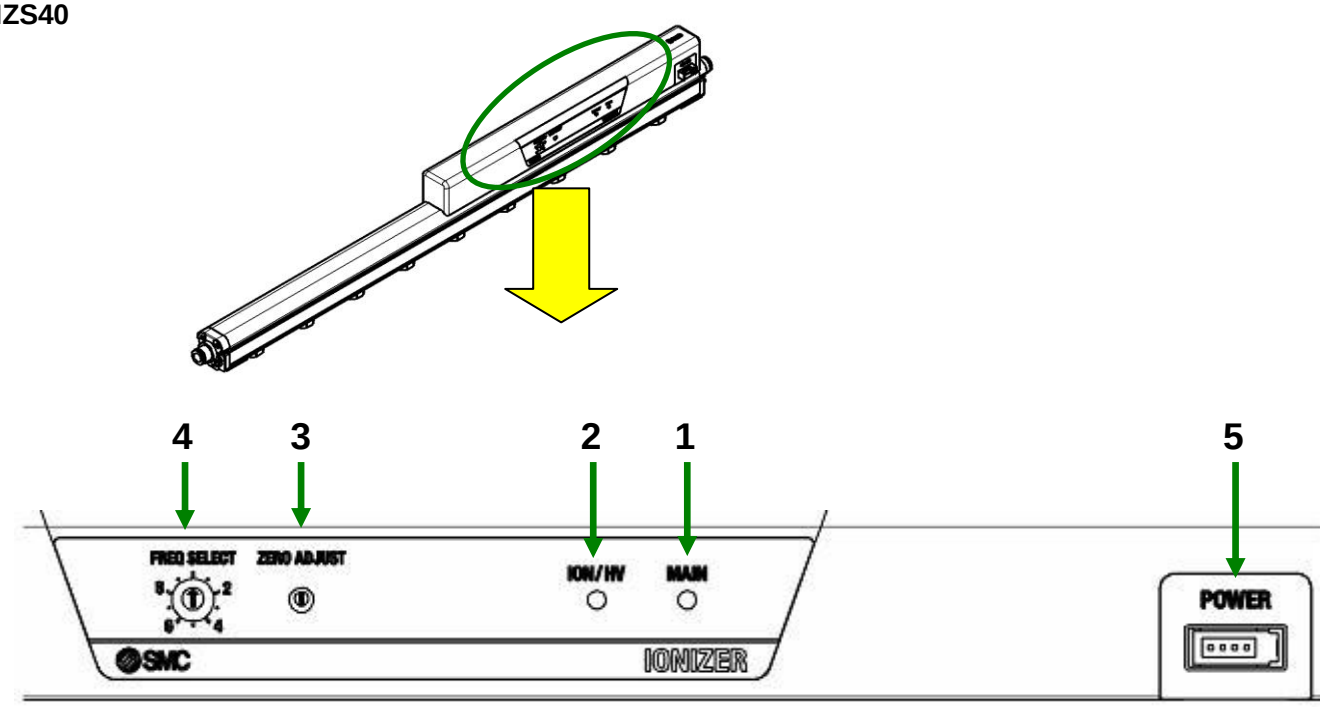
When ionizers are connected in a transition wiring, the same input signal serves as input to all the ionizers. When a signal is output from at least one ionizer in the connection, the signal will be output from the power supply cable.

Connect the power supply cable to the "POWER" connector of the 1st ionizer, and connect the "LINK" connector of the 1st ionizer to the "POWER" connector of the 2nd ionizer with a transition wiring cable. Follow the same procedure to connect subsequent ionizer(s) and after with transition wiring cables.



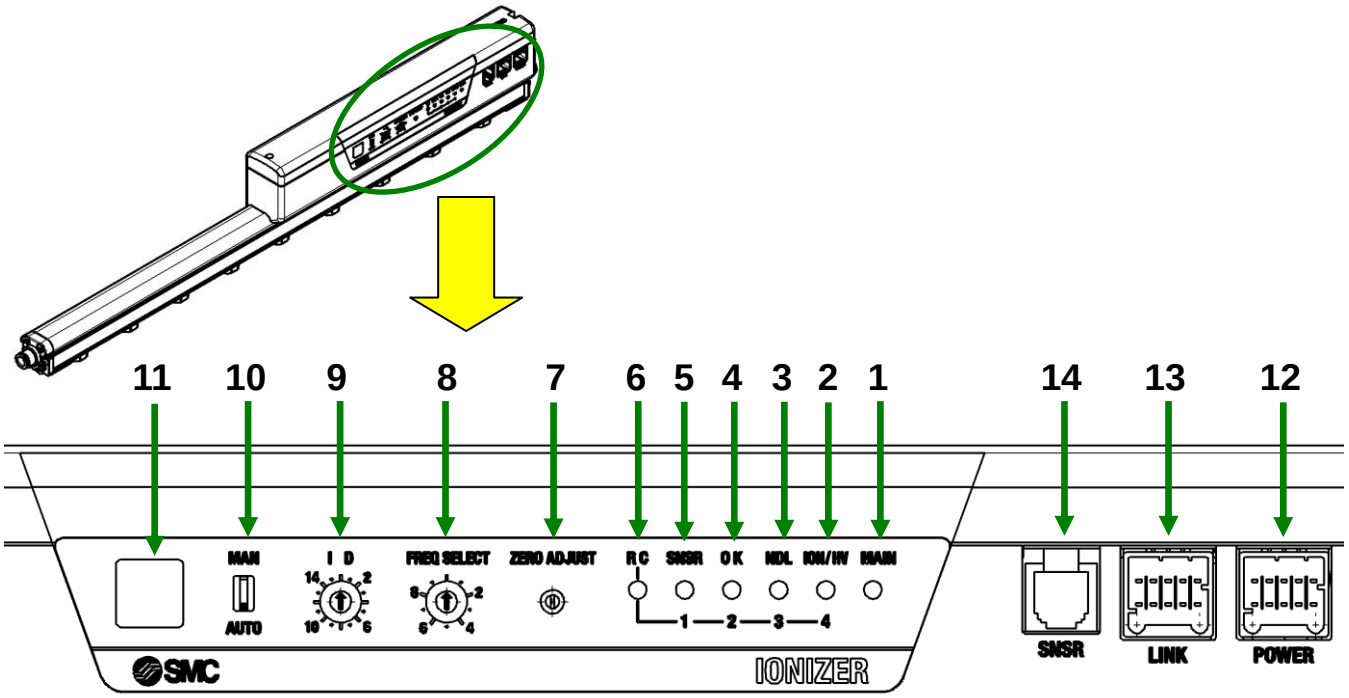
3. Descriptions and Functions of the Panel

IZS40



NO.	Description	Panel indication	Type	Operation
1	Power supply LED	MAIN	LED (Green)	Turns ON when power is supplied, and blinks when power supply voltage failure or CPU operation failure.
2	Ion discharge/ Incorrect high voltage LED	ION/HV	LED (Green)/ LED (Red)	Turns ON (green) when ions are discharged, and blinks (red) when incorrect ion discharge.
3	Ion balance adjustment	ZERO ADJUST	Trimmer	Used for ion balance adjustment. Rotating this trimmer in clockwise direction increases positive ions, and rotating it in counter-clockwise direction increases negative ions.
4	Frequency Set Switch	FREQ SELECT	Rotary switch	Used to set ion generating frequency.
5	Power supply connector	POWER	Connector (e-con)	Used to supply power for ionizer operation and to connect grounding to obtain reference potential.

IZS41, IZS42



NO.	Description	Panel indication	Type	Operation
1	Power supply LED	MAIN	LED (Green)	Turns ON when power is supplied, and blinks when power supply voltage failure or CPU operation failure.
2	Ion discharge/ Incorrect high voltage LED	ION/HV	LED (Green)/ LED (Red)	Turns ON green when ion discharge, blinks green when overcurrent output, and turn ON red when incorrect ion discharge. Blinks red when CPU operation failure as well.
3	Maintenance LED	NDL	LED (Green)	Turns ON when contamination is detected on the electrode needle. Blinks when CPU operation failure while contamination is being detected.
4	Balance complete LED	OK	LED (Green)	Turns ON when ion balance adjustment is completed in the manual operation mode, or when the ionizer is operating with the data adjusted by the manual operation. Blinks during balance adjustment. It also blinks when the ionizer fails to adjust the ion balance in the manual operation mode, as well as the maintenance LED turns ON and the maintenance output turns ON. It also blinks when CPU operation failure.
5	Sensor LED	SNSR	LED (Green)/ LED (Red)	Turns ON green when feedback sensor or auto balance sensor is connected correctly, and turns ON red when there is any problem. It also blinks red when CPU operation failure.
6	Remote controller enable LED	RC	LED (Green)	Turns ON when remote controller setting is enabled, turns OFF when it is disabled, and blinks when a signal is received. It also blinks when CPU operation failure.
7	Ion balance adjustment	ZERO ADJUST	Trimmer	Used for ion balance adjustment. Rotating this trimmer in clockwise direction increases positive ions, and rotating it in counter-clockwise direction increases negative ions.
8	Frequency Set Switch	FREQ SELECT	Rotary switch	Used to set ion generating frequency.
9	ID number set switch	ID	Rotary switch	When remote controller is used for more than one ionizer, use this switch to set an ID number to identify each ionizer. (16 ionizers maximum can be identified.)
10	Operation Mode Set Switch	MAN/AUTO	DIP switch	Sets either manual operation mode (set to MAN) or automatic operation mode (set to AUTO) using auto balance sensor.
11	Receiving part of the remote controller	—	—	Receives infrared rays output from the remote controller (option).
12	Power supply connector	POWER	Connector	It is equipped with input/output ports to be connected to the ionizer for power supply, grounding and controlling ionizer.
13	LINK connector	LINK	Connector	Connector for transition wiring of ionizer.
14	Sensor connection	SNSR	Modular connector	Connects a modular plug of feedback sensor or auto balance sensor. (Feedback sensor can be connected only to IZS41.)

4. Wiring of Cables

Wire cables according to the circuitry and wiring chart.

4-1. Grounding of F.G. cable

Make sure to **ground the F.G. cable (green) with a resistance of 100 ohms or less.**

The F.G. cable is used as a reference electric potential for de-ionization. If the ground terminal F.G. is not grounded, the ionizer will not be able to achieve the optimal ion balance.

4-2. Grounding during operation in DC mode

Applicable models: IZS40 and IZS41

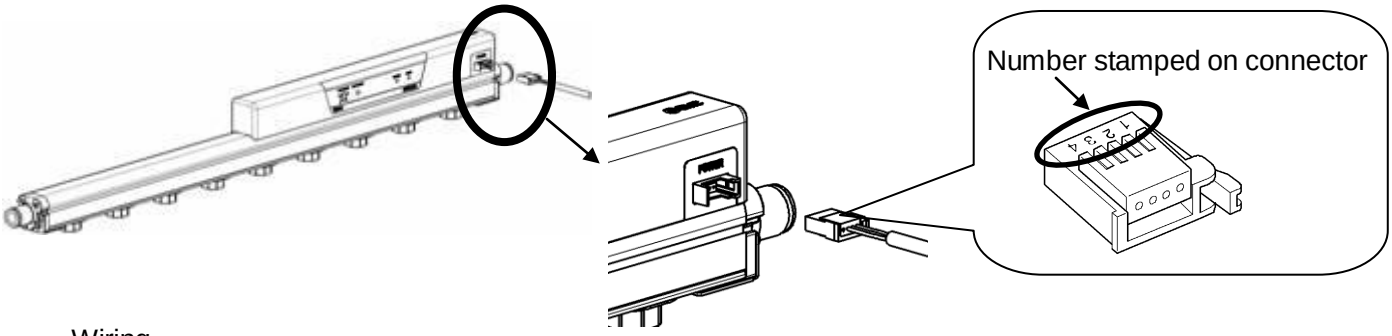
When an ionizer is used in DC mode, make sure to ground the F.G. cable (green) and GND cable (blue) of the input power supply **with a resistance of 100 ohms or less.** Without grounding the GND terminal, the ionizers and/or power supply may be damaged.

4-3. Circuit ("POWER" connector)

4-3-1. Wiring of IZS40

e-con is adopted for the connector of IZS40. Connector with cable or without cable maybe selected when placing an order for the power supply cable.

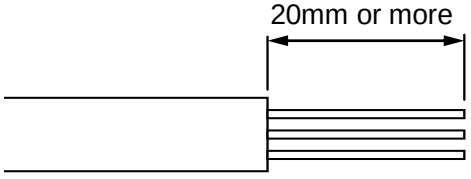
When only an e-con is required, place an order for it as a part. Cable is not supplied.)



Wiring

Number stamped on connector	Signal name	Description
1	24VDC	Power supply is connected to operate the ionizer.
2	GND	
3	F.G.	Make sure to ground with a resistance of 100 ohms or less to use it as a reference electric potential for ionizer.
4	—	Unused

How to connect the cable of the connector

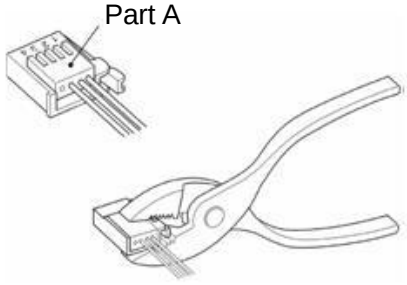


1) Cut the cable as shown in the Figure to the right.

Refer to the following table for the applicable wire size.

Applicable wire

AWG No.	Conductor cross section mm^2	Finish O.D. mm	Model
26-24	0.14-0.2	ϕ0.8-ϕ1.0	ZS-28-C



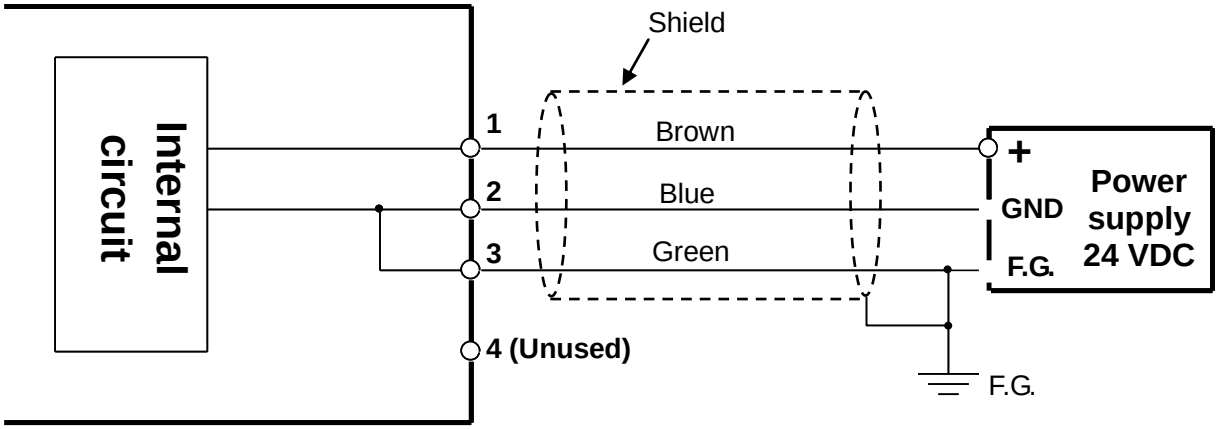
2) Insert the cable which was cut into the back of the connector.

3) Confirm that the cable is inserted into the back of the connector and press part A with your finger to hold tentatively.

4) Use a tool such as pliers to firmly tighten the center of Part A.

5) The connector cannot be reused once crimped. If cable insertion fails, use a new connector.

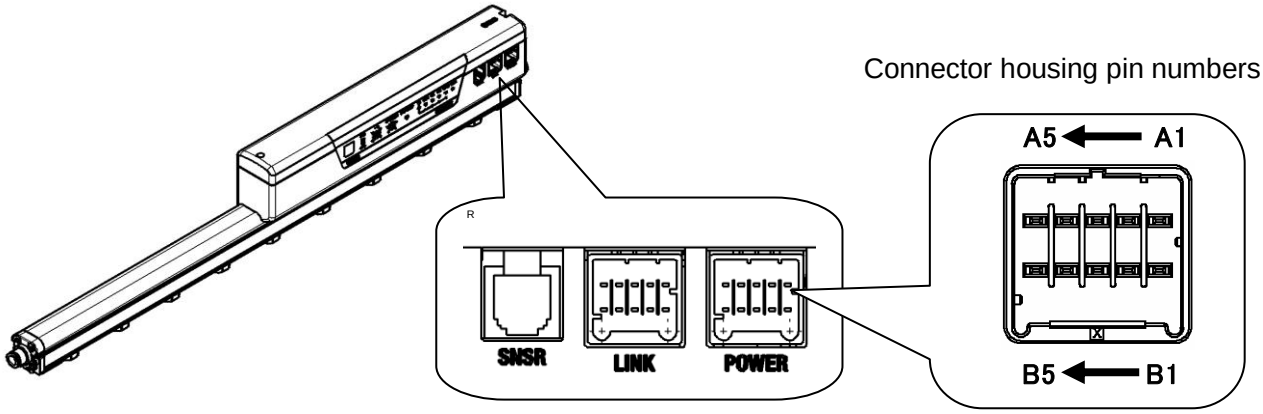
Ionizer (IZS40)



When an ionizer is used in DC mode, make sure to ground the F.G. cable (green) and GND cable (blue) of the input power supply **with a resistance of 100 ohms or less.** Without grounding the GND terminal, the ionizers and/or power supply in connection may be damaged.

If cables are prepared by the user, the cable colors shown in the diagram may change according to the cable colors by the user.

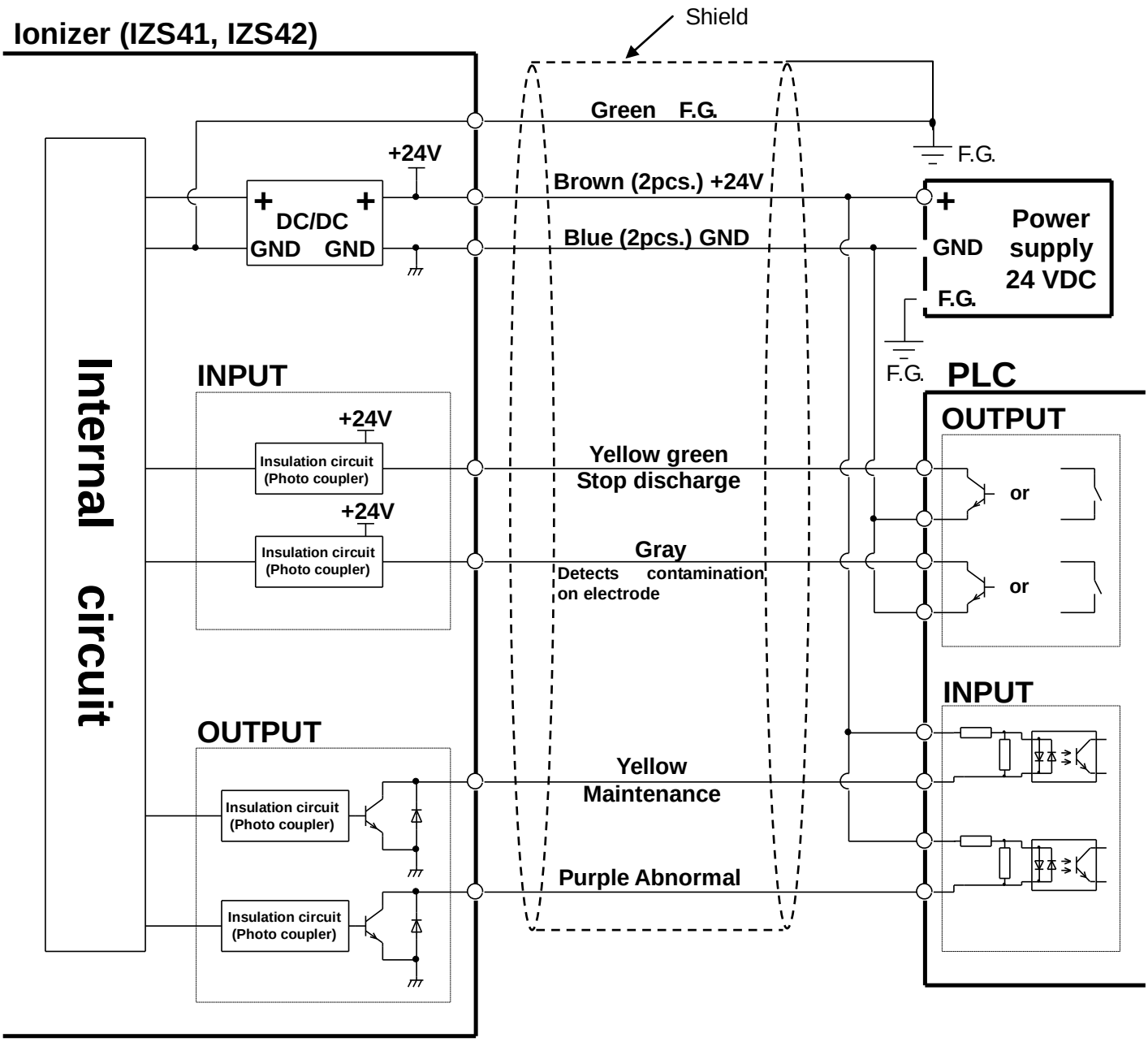
4-3-2. Wiring of IZS41 and IZS42



Wiring

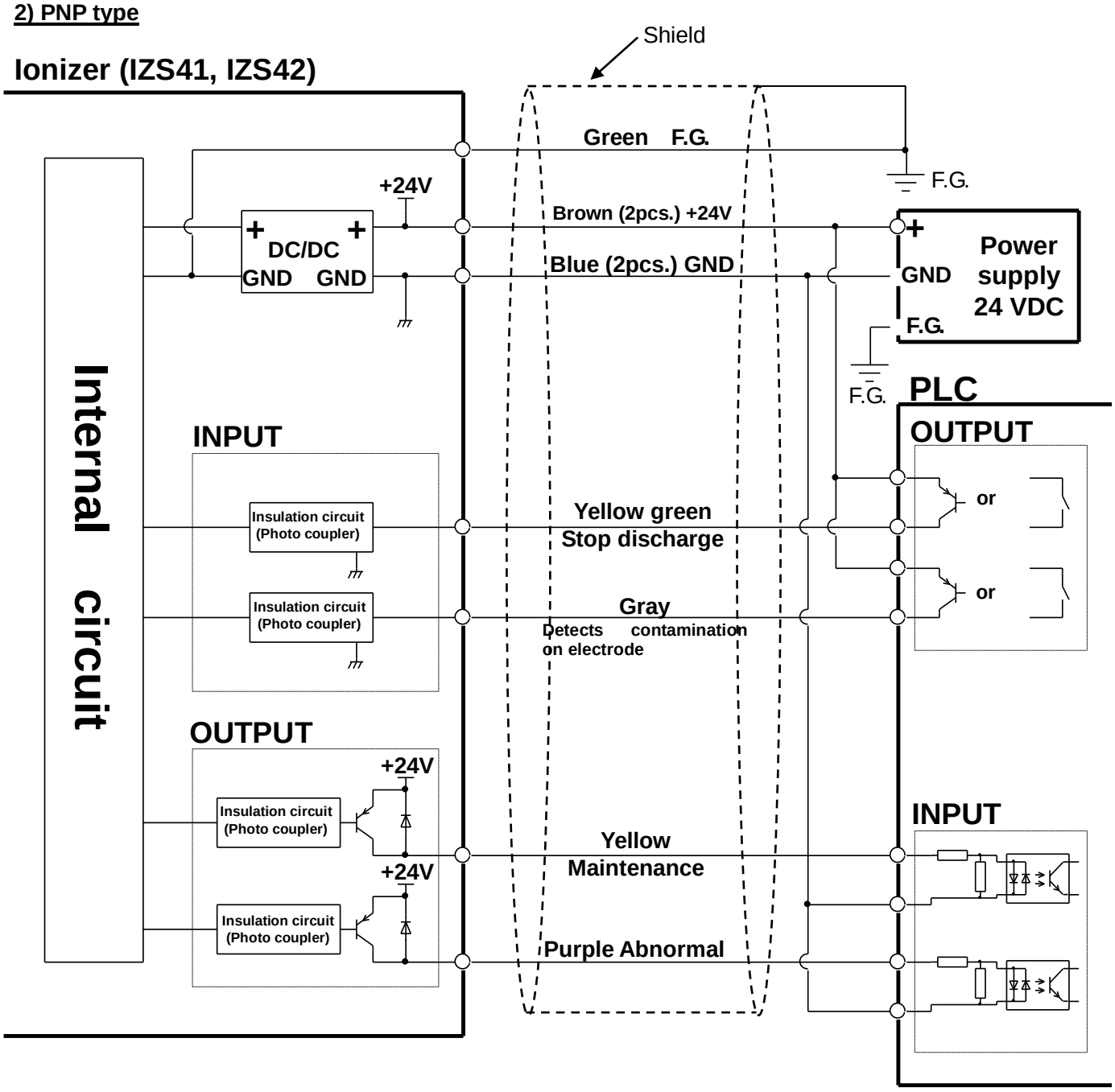
Connector pin numbers	Cable color	Signal name	Signal direction	Description
A1	Brown	DC24V	IN	Power supply is connected to operate the ionizer.
B1				
A2	Blue	GND	IN	
B2				
A3	Green	FG	–	Make sure to ground with a resistance of 100 ohms or less to use it as a reference electric potential for ionizer.
B3	Yellowish green	Ion discharge stop	IN	Signal input to turn ON/OFF the ion discharge. NPN specification: Stops ion discharge by connecting to GND. (Starts discharging ion when disconnected.) PNP specification: Stops ion discharge by connecting to +24 VDC. (Starts discharging ion when disconnected.)
A4	Gray	Electrode contamination detection	IN	Signal to input when finding if maintenance of electrode is necessary.
B4	Yellow	Maintenance signal	OUT (Contact point A)	Turns ON when electrode needs cleaning.
A5	Purple	Error signal	OUT (Contact point B)	Turns OFF when power supply failure, ion discharge error, connected sensor failure, or CPU operation failure. (ON when there is no problem.)
B5	White	Unused	–	—

1) NPN type



When an ionizer (IZS41) is used in DC mode, make sure to ground the F.G. cable (green) and GND cable (blue) of the input power supply **with a resistance of 100 ohms or less.** Without grounding the GND terminal, the ionizers and/or power supply in connection may be damaged.

2) PNP type

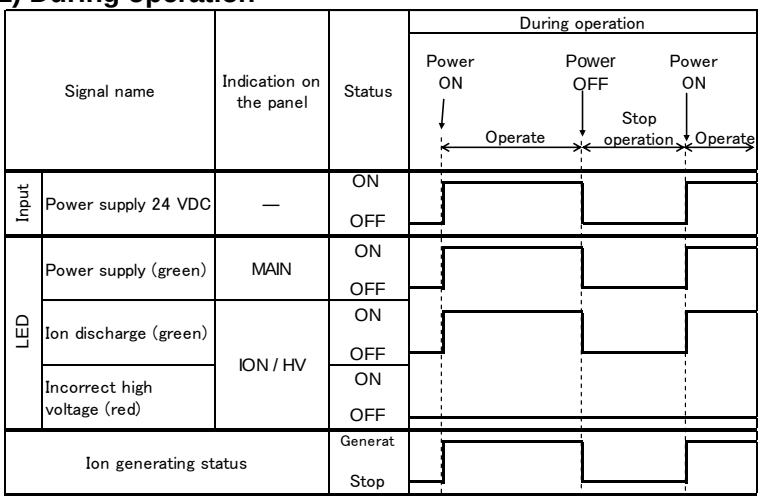


When an ionizer (IZS41) is used in DC mode, make sure to ground the F.G. cable (green) and GND cable (blue) of the input power supply **with a resistance of 100 ohms or less.** Without grounding the GND terminal, the ionizers and/or power supply in connection may be damaged.

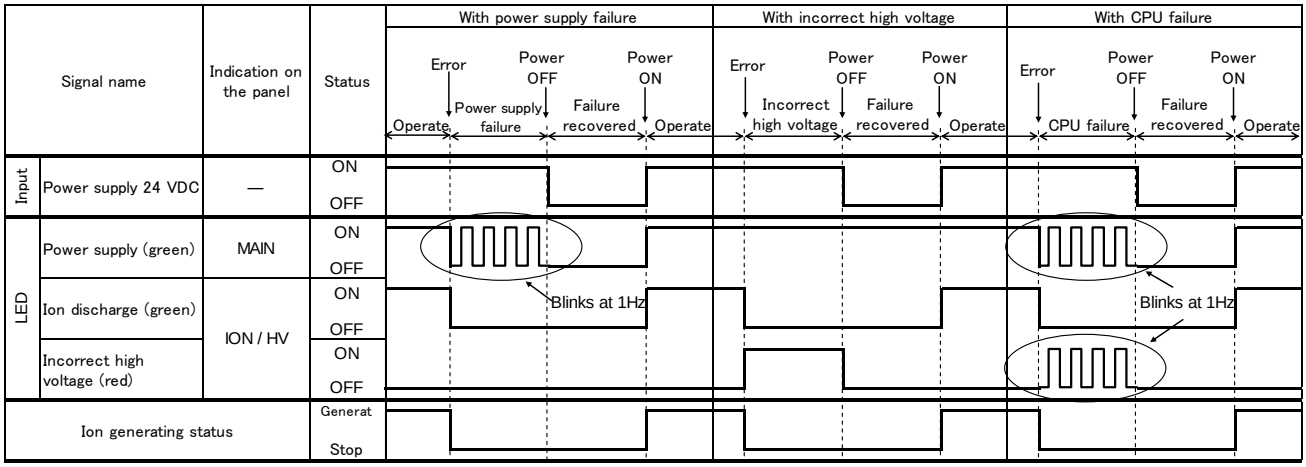
4-4. Timingchart

4-4-1.IZS40

1) During operation

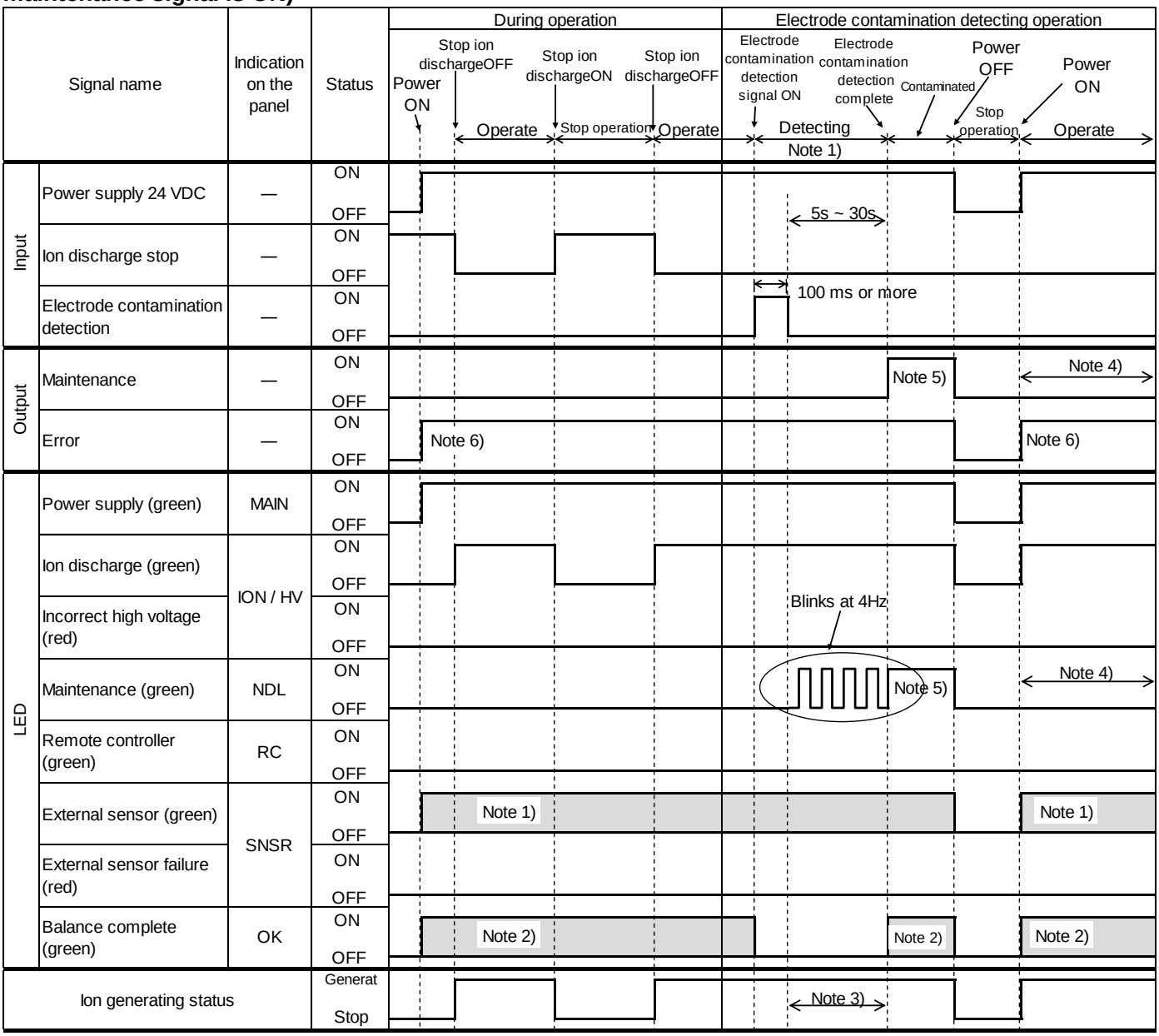


2) When abnormality occurs



4-4-2. IZS41, IZS42

1) During operation using internal sensor or feedback sensor, During automatic operation using auto balance sensor (high accuracy type), During electrode contamination detection operation (when maintenance signal is ON)

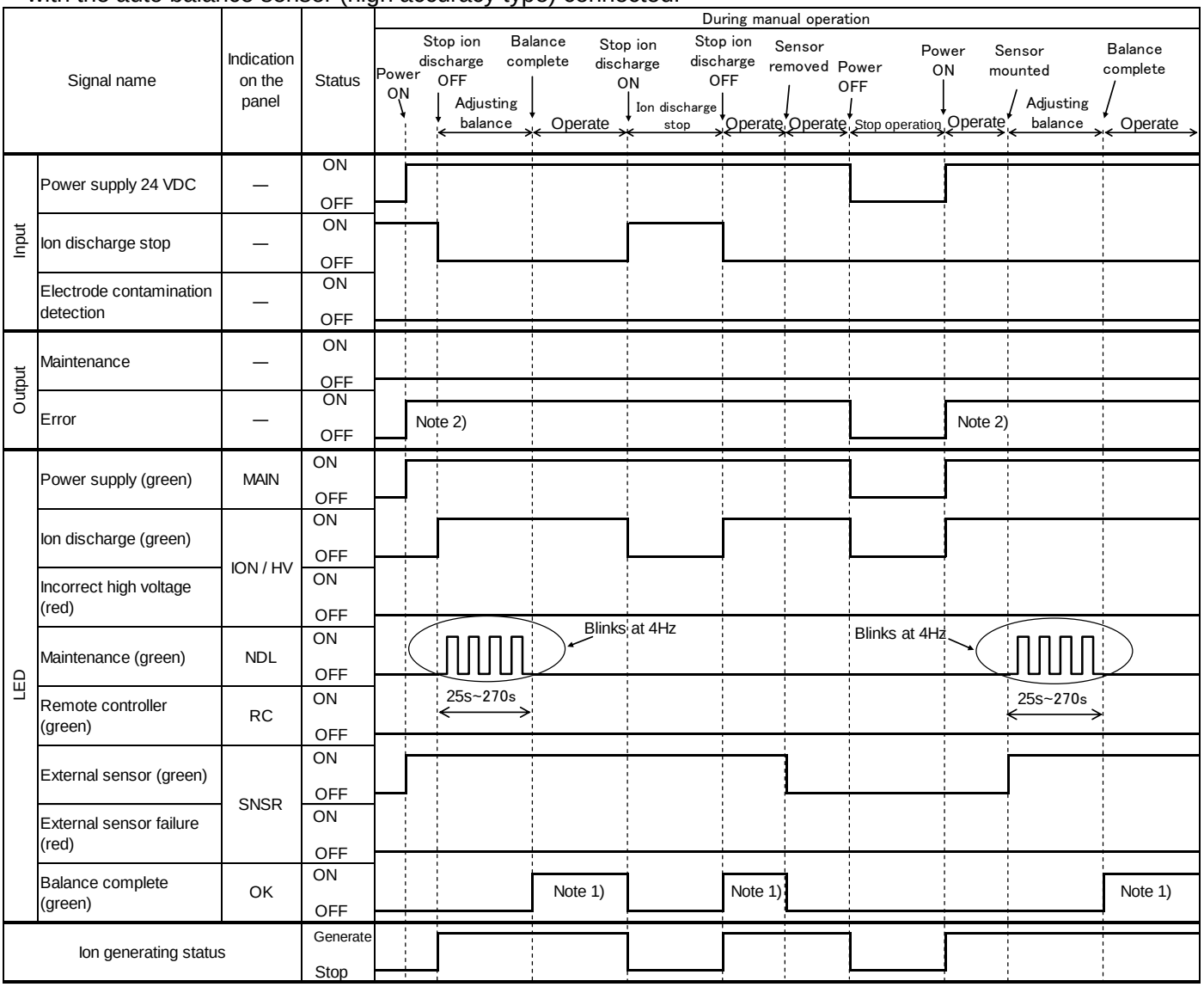


- During the automatic operation with an auto balance sensor (high accuracy type), set the DIP switch of the ionizer to AUTO.
- When an external sensor is connected, the ion balance adjusting trimmer of the ionizer is disabled

Note 1) When an external sensor is connected, green LED of SNSR turns ON, and it turns OFF when disconnected.
Note 2) In the sensing AC mode using a feedback sensor, the OK LED turns ON when the ion balance is within the range of +/- 30V, and it blinks when the ion balance is within the range between +/- 30V and +/- 300V at 4Hz. The OK LED turns ON when the ion balance is within +/- 30V during the automatic operation using an auto balance sensor (high accuracy type). If the ion balance cannot be adjusted to be within ±30V, both the maintenance LED and maintenance output signal turn ON.
Note 3) As electrode contamination is detected with positive and negative ions discharged, perform the detection without any workpiece.
Note 4) Maintenance output ON is cleared and the maintenance LED turns OFF by re-supplying power. To perform electrode contamination detection again, input the electrode contamination detection signal.
Note 5) When contamination is detected, the maintenance output and maintenance LED turn ON, and when no contamination is detected, the maintenance output and maintenance LED turn OFF.
Note 6) There is a delay of approx. 500ms after power is supplied until a valid signal is output. When using the output signal(s) with a PLC, do not perform any signal processing for a minimum of 1 second after supplying power to the ionizer.

2) During manual operation

Manual operation is an operation mode that is enabled when the Operation Mode Set Switch is set to MAN with the auto balance sensor (high accuracy type) connected.



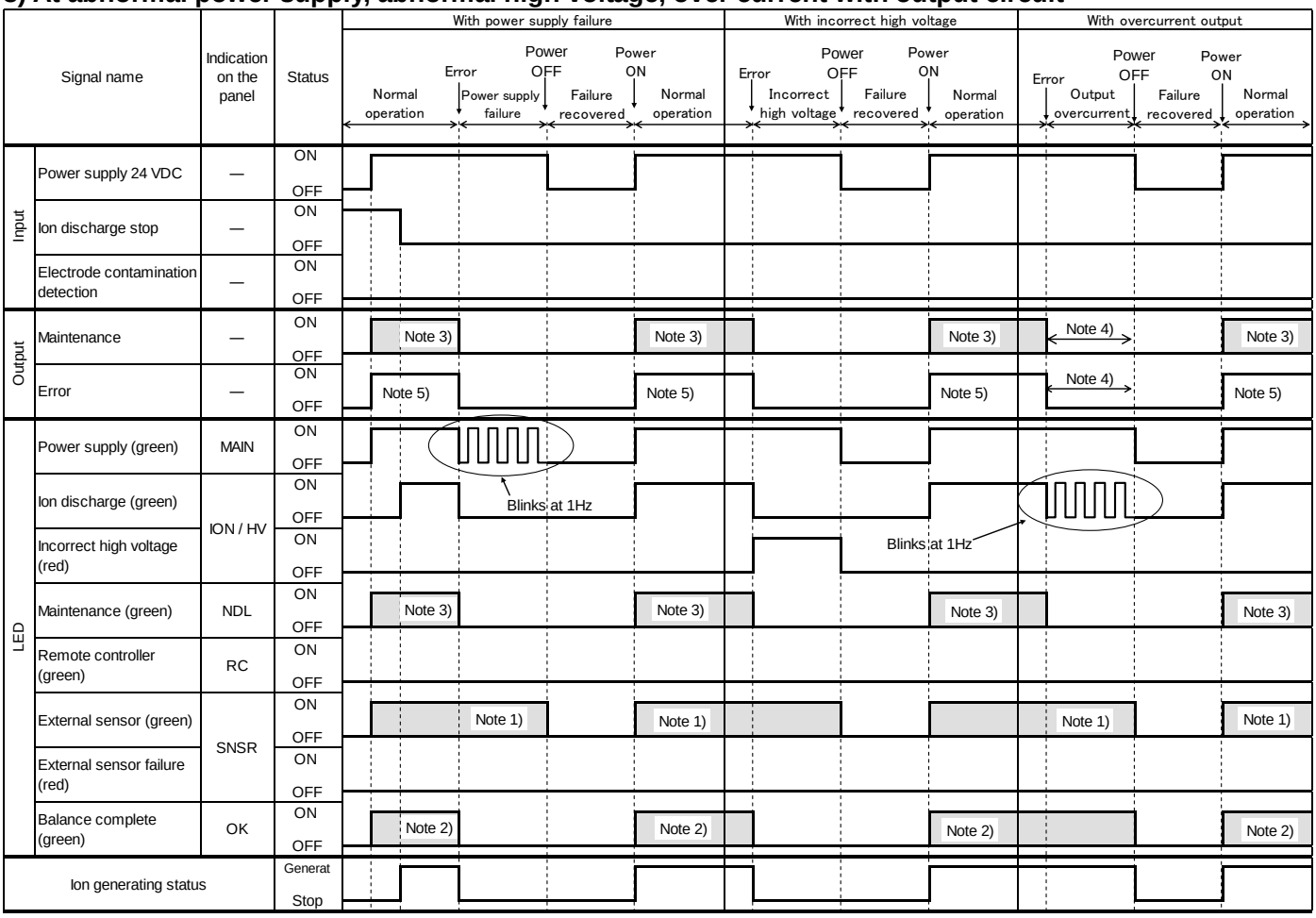
Signal name		Indication on the panel	Status
Input	Power supply 24 VDC	—	ON / OFF
	Ion discharge stop	—	ON / OFF
	Electrode contamination detection	—	ON / OFF
Output	Maintenance	—	ON / OFF
	Error	—	ON / OFF
LED	Power supply (green)	MAIN	ON / OFF
	Ion discharge (green)	ION / HV	ON / OFF
	Incorrect high voltage (red)		ON / OFF
	Maintenance (green)	NDL	ON / OFF
	Remote controller (green)	RC	ON / OFF
	External sensor (green)	SNSR	ON / OFF
	External sensor failure (red)		ON / OFF
	Balance complete (green)	OK	ON / OFF
Ion generating status			Generate / Stop

- For manual operation, set the DIP switch of the ionizer to MAN, and connect an auto balance sensor (high accuracy type).
- During manual operation, ion balance adjustment of the ionizer is disabled.
- The ion balance adjusting trimmer of the ionizer is enabled when the DIP switch of the ionizer is set to AUTO without connecting any external sensor.

Note 1) LED turns ON when ion balance is within +/− 30 during the manual operation.

Note 2) There is a delay of approx. 500ms after power is supplied until a valid signal is output.
When using the output signal(s) with a PLC, do not perform any signal processing for a minimum of 1 second after supplying power to the ionizer.

3) At abnormal power supply, abnormal high voltage, over current with output circuit



Note 1) When a sensor is connected, green LED of SNSR turns ON, and it turns OFF when disconnected.

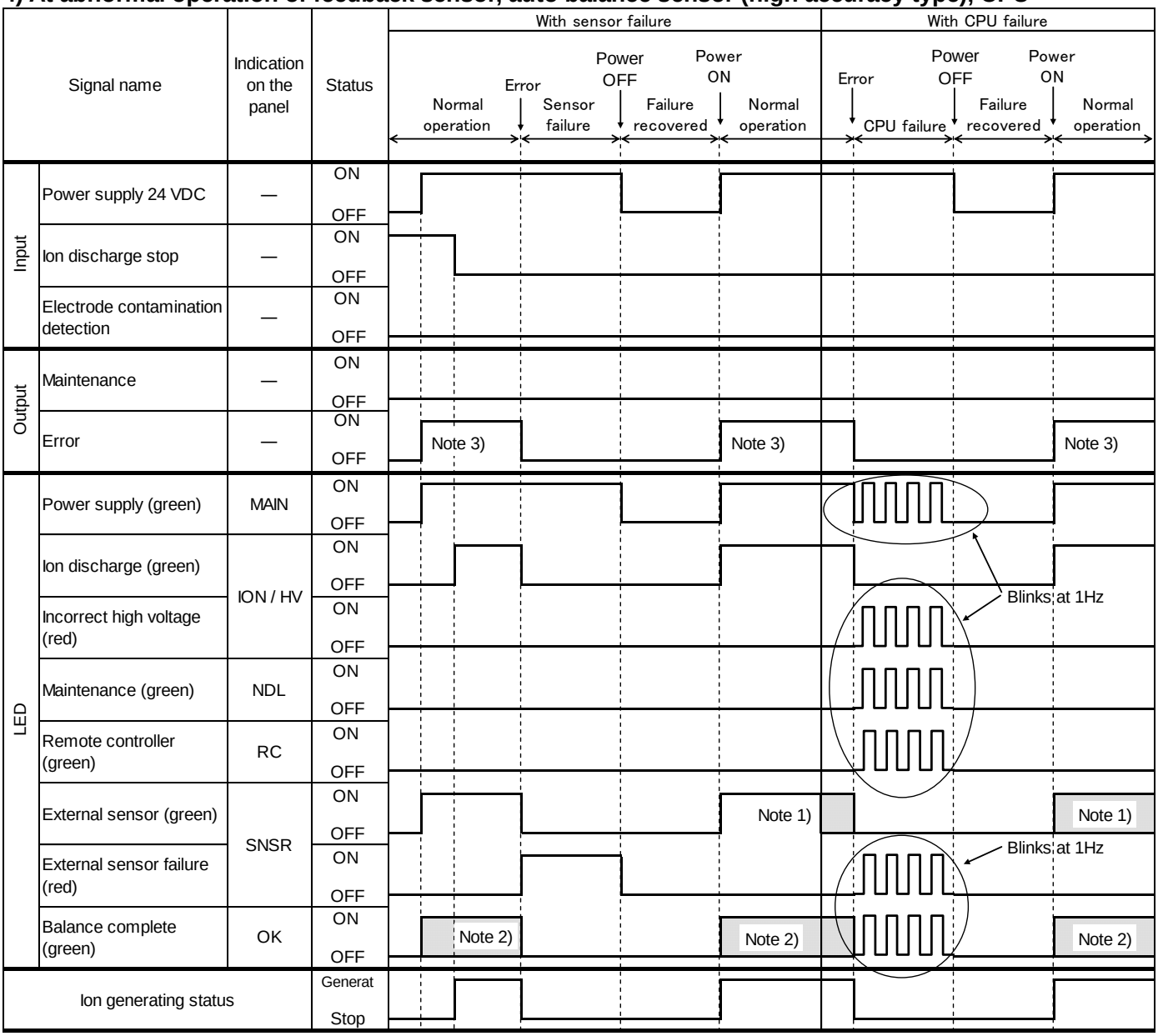
Note 2) When de-ionization is completed in the sensing AC mode with a feedback sensor, or when the ionizer is operating in the automatic operation mode or in a manual operation mode with an auto balance sensor (high accuracy type), the OK LED turns ON when the ion balance is less than +/- 30V, and the OK LED turns OFF when the feedback sensor or an auto balance sensor (high accuracy) is not connected. In the sensing AC mode using a feedback sensor, the OK LED turns ON when the ion balance is within +/- 30V, and it blinks at 4Hz when the ion balance is within the range of +/- 30V and +/- 300V. In the automatic operation mode and manual operation mode using an auto balance sensor (high accuracy type), the OK LED turns ON within the ion balance of +/- 30V.

Note 3) When electrode is still contaminated after operating the electrode contamination detection, the maintenance output and maintenance LED turn ON, and when the electrode is not contaminated after the contamination detection, the maintenance output and maintenance LED turn OFF. When it fails to adjust the ion balance during an automatic operation or manual operation using an auto balance sensor (high accuracy type), the maintenance output and maintenance LED turn ON.

Note 4) When overcurrent flows to the maintenance output circuit or abnormal output circuit, the maintenance output or abnormal output will be turned OFF.

Note 5) There is a delay of approx. 500ms after power is supplied until a valid signal is output.
When using the output signal(s) with a PLC, do not perform any signal processing for a minimum of 1 second after supplying power to the ionizer.

4) At abnormal operation of feedback sensor, auto balance sensor (high accuracy type), CPU



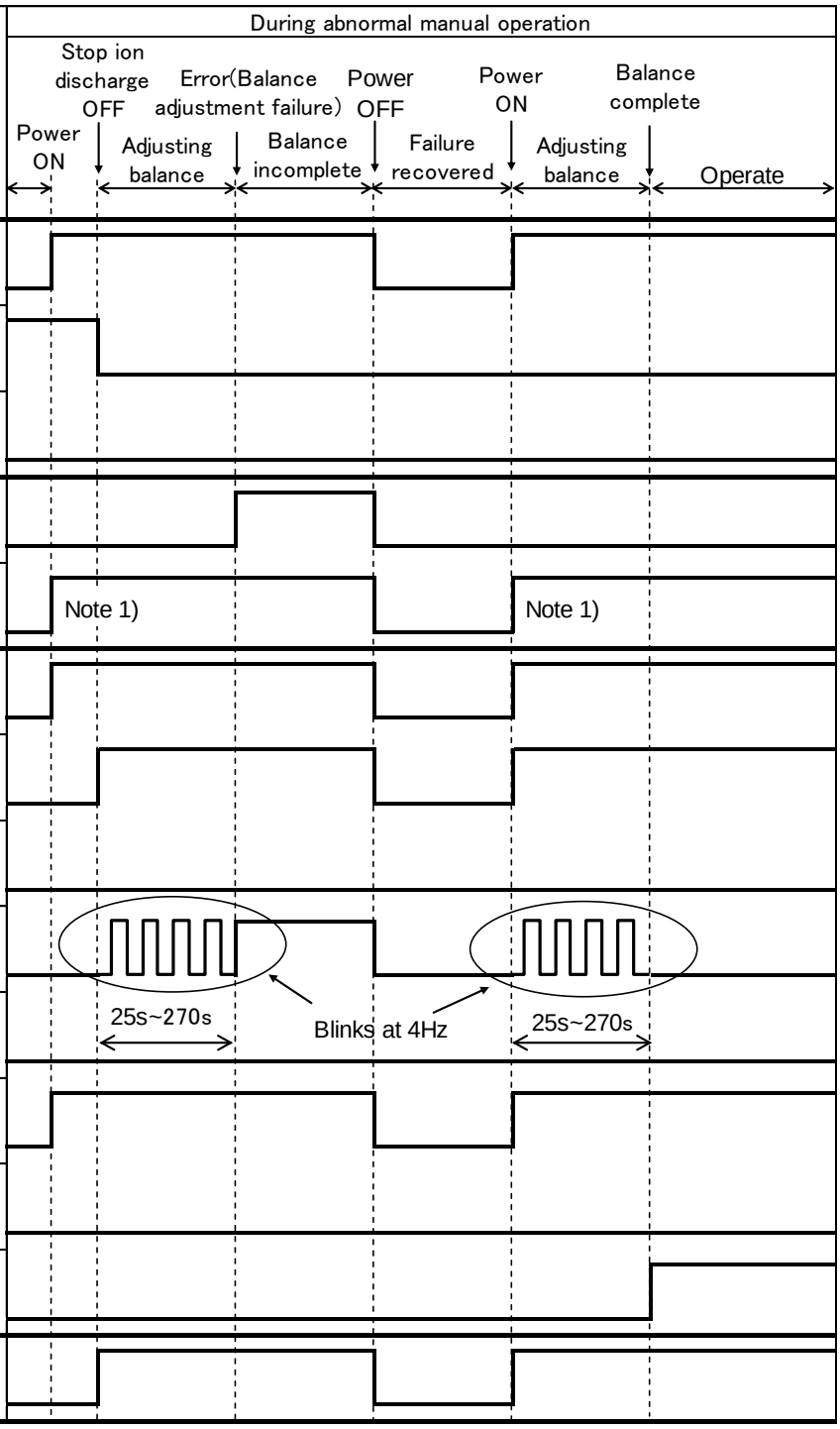
Note 1) When a sensor is connected, green LED of SNSR turns ON, and it turns OFF when disconnected.

Note 2) When de-ionization is completed in the sensing AC mode with a feedback sensor, or when the ionizer is operating in the automatic operation mode or in a manual operation mode with an auto balance sensor (high accuracy type), the OK LED turns ON when the ion balance is less than +/- 30V, and the OK LED turns OFF when the feedback sensor or an auto balance sensor (high accuracy) is not connected.

Note 3) There is a delay of approx. 500ms after power is supplied until a valid signal is output.
When using the output signal(s) with a PLC, do not perform any signal processing for a minimum of 1 second after supplying power to the ionizer.

5) During abnormal manual operation

	Signal name	Indication on the panel	Status
Input	Power supply 24 VDC	—	ON / OFF
Input	Ion discharge stop	—	ON / OFF
Input	Electrode contamination detection	—	ON / OFF
Output	Maintenance	—	ON / OFF
Output	Error	—	ON / OFF
LED	Power supply (green)	MAIN	ON / OFF
LED	Ion discharge (green)	ION / HV	ON / OFF
LED	Incorrect high voltage (red)	ION / HV	ON / OFF
LED	Maintenance (green)	NDL	ON / OFF
LED	Remote controller (green)	RC	ON / OFF
LED	External sensor (green)	SNSR	ON / OFF
LED	External sensor failure (red)	SNSR	ON / OFF
LED	Balance complete (green)	OK	ON / OFF
	Ion generating status		Generat / Stop



Note 1) There is a delay of approx. 500ms after power is supplied until a valid signal is output.
When using the output signal(s) with a PLC, do not perform any signal processing for a minimum of 1 second after supplying power to the ionizer.

5. Function

5-1. Operation modes

This product has 4 operation modes AC mode, dual AC mode, sensing AC mode and DC mode. The applicable operation mode varies depending on the model.

Ionizer operation modes

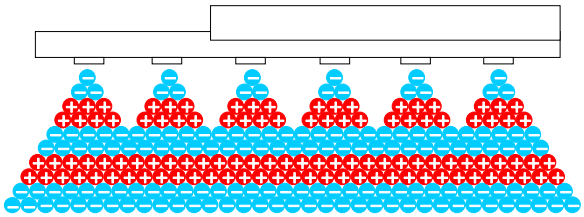
- IZS40
  - AC mode (During continuous de-ionizing operation)
  - DC mode (Either positive ions or negative ions are continuously discharged during operation)
- IZS41
  - AC mode
    - Continuous de-ionizing operation
    - Manual operation (When auto balance sensor [high accuracy type] is used)
    - Automatic operation (When auto balance sensor [high accuracy type] is used)
  - Sensing AC mode
    - Energy saving operation (When feedback sensor is used)
    - Continuous de-ionizing operation (When feedback sensor is used)
  - DC mode (Either positive ions or negative ions are continuously discharged during operation)
- IZS42 — Dual AC mode
  - Continuous de-ionizing operation
  - Manual operation (When auto balance sensor [high accuracy type] is used)
  - Automatic operation (When auto balance sensor [high accuracy type] is used)

5-1-1. Operation modes of IZS40

1) AC mode

Ions of different polarity are generated alternately according to the frequency set for FREQ SELECT to de-ionize.

When ion balance becomes unbalanced due to ionizer installation environment, it may be adjusted using a balance adjusting trimmer.



Ion generation image in AC mode

2) DC mode

Positive ("+") or Negative ("-") ions are generated according to either polarity set for FREQ SELECT.

5-1-2. Operation modes of IZS41

1) AC mode

AC mode has three operation modes shown below.

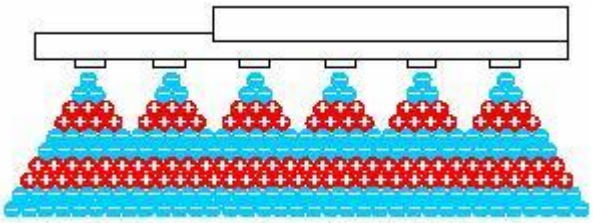
Continuous de-ionizing operation mode

Sensor inside the ionizer detects the ion condition around the ionizer. When there is an ion imbalance, the ionizer generates ions of different polarity alternately to de-ionize and achieve the optimum ion balance.

When operating in this mode, set the operation mode select switch to "AUTO".

Ion generation frequency is set for FREQ SELECT.

When ion balance becomes unbalanced due to ionizer installation environment, it can be adjusted using a balance adjusting trimmer.



Ion generation image in AC mode

Manual operation mode (When auto balance sensor [high accuracy type] is used)

To adjust an ion imbalance due to the installation environment, an ion balance adjusting trimmer (manual) is mounted. A measuring instrument is necessary when adjusting the ion balance.

In the manual operation mode, the sensor is used to automatically adjust the ion balance with the balance adjusting trimmer while checking the output from the measuring instrument. After completing the ion balance adjustment, the operation proceeds to a continuous de-ionizing operation with the internal sensor.

In the manual operating mode, the auto balance sensor (high accuracy type) is installed close to the workpiece or at the position where it is required to detect the ion balance. Ions which are generated from the ionizer are detected by the auto balance sensor (high accuracy type) and will automatically optimize the ion balance. After adjusting the ion balance, it is possible to operate the ionizer with the sensor removed.

When selecting this operation mode, connect the auto balance sensor (high accuracy type) to the ionizer and set the Operation Mode Set Switch to "MAN".

When installing the auto balance sensor (high accuracy type), face the metallic surface of the sensor to the ionizer and mount it to the same level as the workpiece or at the position where the ion balance shall to be detected.

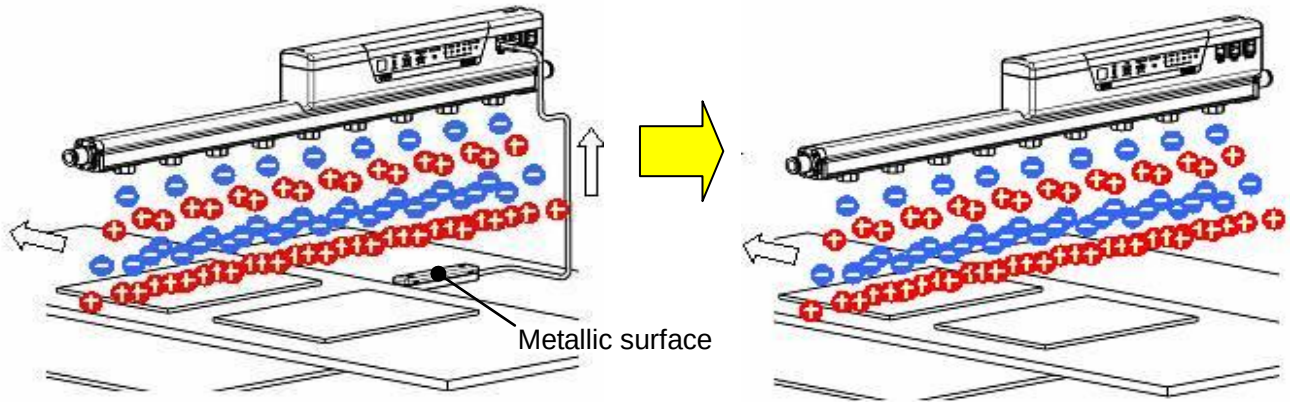
It is recommended to position the sensor 100 to 2000mm from the ionizer. The sensor can be used at a distance out of this range, but it may not operate normally depending on the operating conditions. Be certain to confirm the normal operation mode before starting operation.

After completing the balance adjustment in the manual operation mode, the balance adjusting trimmer will be disabled.

To enable the balance adjusting trimmer, remove the sensor, and set the Operation Mode Set Switch to "AUTO". (Manual operation will be disabled.)

By adjusting the ion balance in the manual operation mode, the adjusting hours may be reduced, and variation in the ion balance due to adjustment by different operators can be eliminated.

When ion balance adjustment with higher accuracy is required, it is recommended to use a measuring instrument such as charge plate monitor and adjust manually.

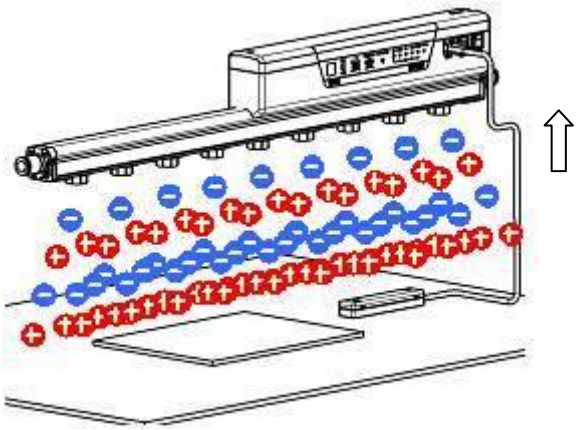


Automatic operation mode (When auto balance sensor [high accuracy type] is used)

When selecting this operation mode, connect the auto balance sensor (high accuracy type) to the ionizer, and set the Operation Mode Set Switch to "AUTO".

In the automatic operation mode, the ionizer maintains the optimal ion balance with the auto balance sensor (high accuracy type) detecting ions which are generated from the ionizer. For this reason, auto balance sensor (high accuracy type) should be installed close to the workpiece or in a position where the ion balance needs to be detected.

In the automatic operation mode, the balance adjusting trimmer will be disabled.



Example of ion discharge by IZS41

"Automatic operation mode" is recommended for de-ionizing a workpiece which is stationary or for de-ionizing the entire room.

2) Sensing AC mode

In the sensing AC mode, a feedback sensor detects the electrification of the workpiece. The ionizer discharges ions of the opposite polarity to the ions on the workpiece. This reduces the de-ionizing time.

Sensing AC mode is suitable for de-ionizing a workpiece which has a high electrification potential or which moves at a high speed.

Electrification of the workpiece can be detected automatically by connecting a feedback sensor to the ionizer.

The feedback sensor should be mounted with the detecting port facing the workpiece.

It is recommended that the sensor is positioned 10 to 50mm from the workpiece. The sensor can be used at a distance out of this range, but it may not operate normally depending on the operating conditions. Be certain to confirm the normal operation before starting operation. When feedback sensor is connected, the balance adjusting trimmer will be disabled.

Sensing AC mode has two operation modes as shown below.

Energy saving operation mode (When feedback sensor is used)

In the energy saving operation mode, when electrification potential of the workpiece becomes +/- 30V or less (at the sensor installation level of 25mm), the ionizer automatically stops discharging ions. The ionizer discharges ions automatically when the electrification potential of the workpiece exceeds +/- 30V.

When this operation mode is selected, connect the feedback sensor to the ionizer and set the rotary switch with the FREQ SELECT indicator to 8 or 9.

Energy saving operation mode is recommended for de-ionization of a conductive workpiece.

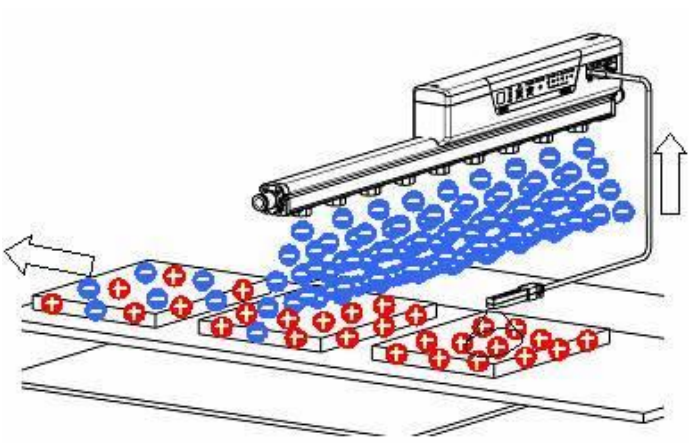
Continuous de-ionizing operation mode (When feedback sensor is used)

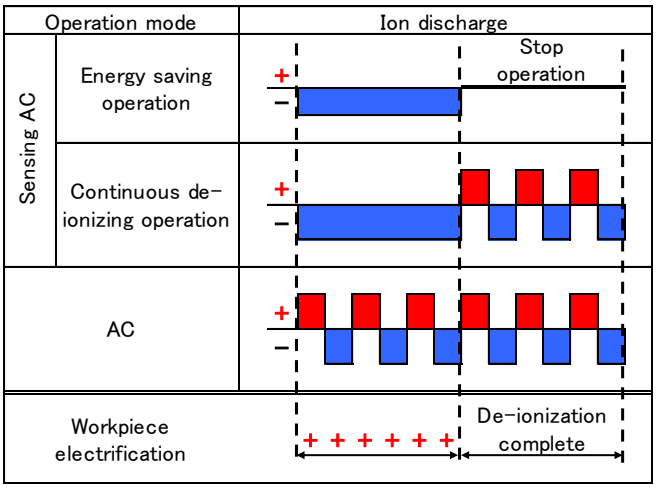
In the continuous de-ionizing operation mode, the operation is switched to AC operation when the electrification potential of the workpiece becomes +/- 30V or less, and keeps de-ionizing continuously.

When this operation mode is selected, connect a feedback sensor to the ionizer and set the frequency (when the operation is switched to AC operation) on the rotary switch with the FREQ SELECT indicator from 1 to 7.

For setting the frequency from 1 to 7 with the rotary switch, refer to "5-2. Frequency Set Switch".

Continuous de-ionizing operation mode is recommended for de-ionization of a non-conductive workpiece.





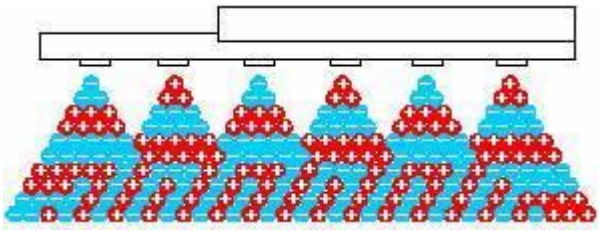
3) DC mode

Positive ("+") or Negative ("-") ions are generated according to either polarity set for FREQ SELECT.

5-1-3. Operation modes of IZS42

In the dual AC mode, ions of different polarity are generated alternately from electrodes positioned next to each other, and either "+" or "-" ions are generated according to the frequency set for FREQ SELECT to de-ionize.

In the dual AC mode, it is possible to reduce the potential amplitude applied to the workpiece compared with in the AC mode. (Refer to "6. Performance" for details)



Ion generation image in dual AC mode

For operation mode of IZS42, continuous de-ionization operation mode, manual operation mode (when using an auto balance sensor [high accuracy type]), or automatic operation mode (when using an auto balance sensor [high accuracy type]) can be selected.

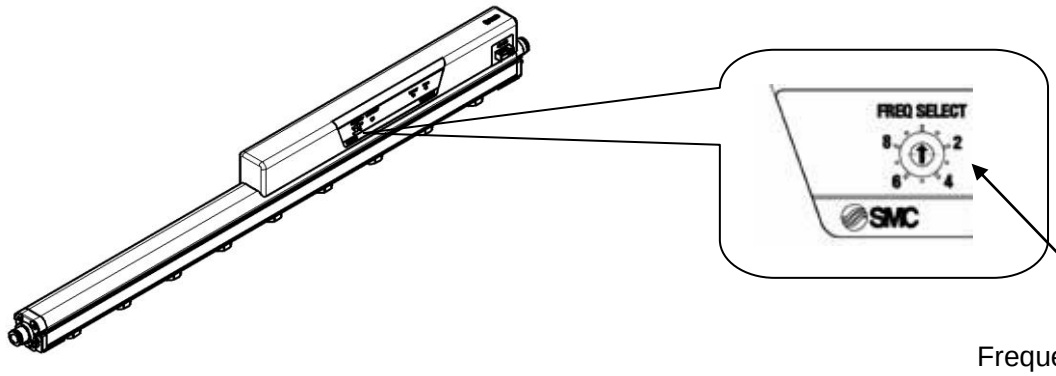
Each operation mode is same as that of the IZS41 excluding the ion generating method. Refer to "Continuous de-ionizing operation mode", "Manual operation mode (When auto balance sensor [high accuracy type] is used)" and "Automatic operation mode (When auto balance sensor [high accuracy type] is used)" in "1) AC mode" in "5-1-2. Operation modes of IZS41".

5-2. Frequency Set Switch

This switch is used to enable the frequency when operating the ionizer, after de-ionization in the sensing AC mode is completed (IZS41) and for selecting the settings of the remote controller (IZS41 and IZS42). Use a rotary switch with the FREQ SELECT indicator for setting the frequency.

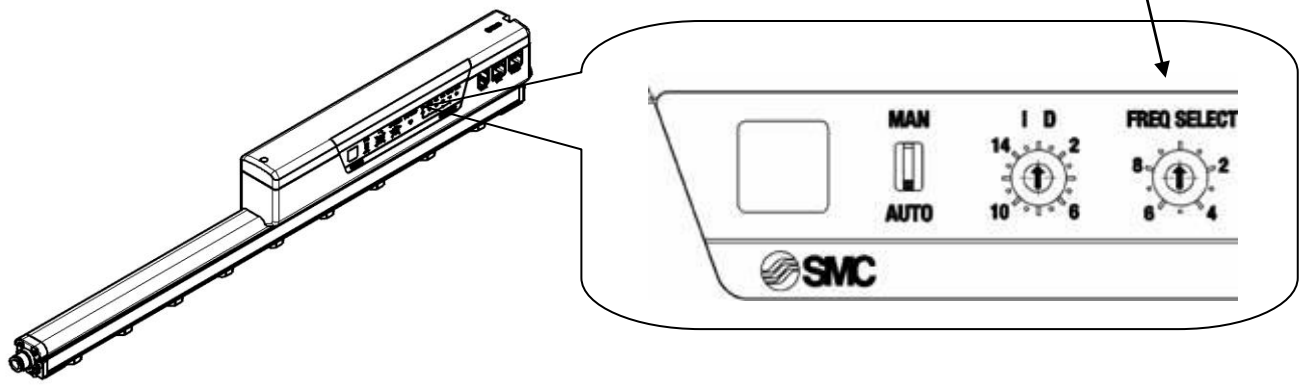
Settings performed by the Frequency Set Switch are as shown in the table.

IZS40



Frequency Set Switch
(Fig. shows the setting to 0.)

IZS41, IZS42



Frequency Set Switch set No.	Frequency (Hz), Remote controller		
	IZS40	IZS41	IZS42
0	1	Remote controller *1	Remote controller *1
1	3	1	0.1
2	5	3	0.5
3	8	5	1
4	10	10	3
5	15	15	5
6	20	20	10
7	30	30	15
8	DC +	DC +	20
9	DC −	DC −	30

*1: Set when remote controller is used.

5-3. Adjustment of ion balance

Ion balance of the ionizer is adjusted before shipment. However, readjustment might be required depending on the installation environment when ion adjustment can be performed. (The same applies when the ionizer is moved and installed in a different location.)

Ion balance can be adjusted either by manual adjustment (IZS40, IZS41 and IZS42) or manual operation using an auto balance sensor (high accuracy type) (IZS41 and IZS42).

When there are ionizers installed near the ionizer whose ion balance is to be adjusted, stop the ionizers which are not adjusted for the ion balance before starting adjustment.

5-3-1. Manual ion balance adjustment

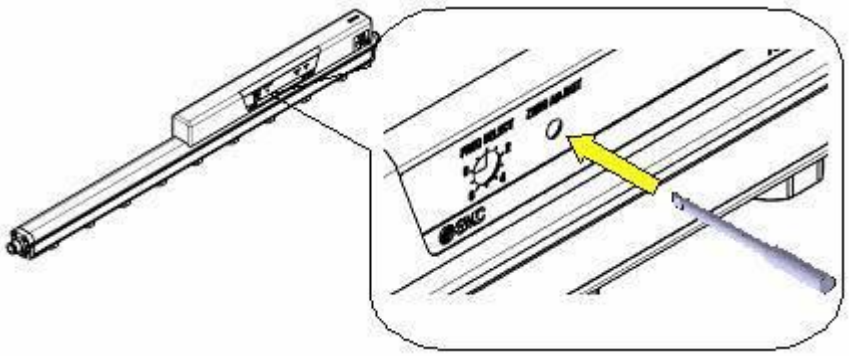
Applicable models: IZS40, IZS41, IZS42

Manual ion balance adjustment can be performed using a balance adjusting trimmer which has an indication of ZERO ADJUST.

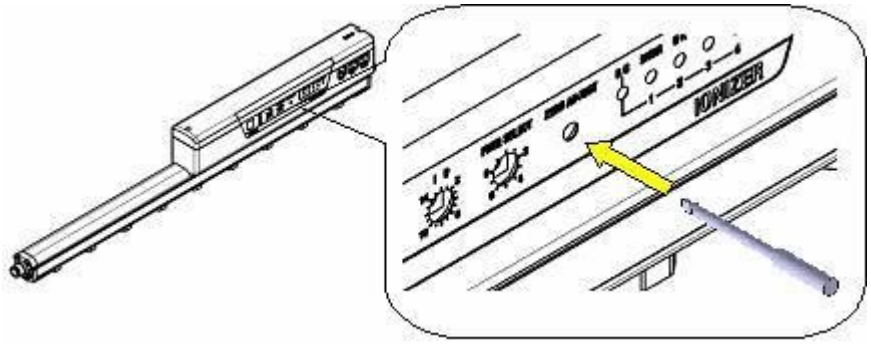
When performing the manual adjustment of the ion balance, use a measuring instrument such as a charge plate monitor.

For adjustment, rotate the trimmer (using a flathead screwdriver) counterclockwise to increase the positive ions; and rotate the trimmer counterclockwise to increase the negative ions.

IZS40



IZS41, IZS42



5-3-2. Balance adjustment by manual operation

Applicable models: IZS41, IZS42

In the ion balance adjustment manual operation, the auto balance sensor (high accuracy type) detects the ion balance and shall maintain an optimal balance. For this reason, install the auto balance sensor (high accuracy type) at a position where the ion balance is required to be adjusted (e.g. close to the workpiece).

Manual operation can be started by setting the Operation Mode Set Switch to MAN and turning power ON with the auto balance sensor (high accuracy type) connected.

When ion balance adjustment is completed, the balance complete LED (OK) turns ON and the ionizer operates within the adjusted ion balance setting. When ion balance adjustment fails to be completed in a defined period of time, the maintenance output signal turns ON, and the maintenance LED (NDL) turns ON as well. (Abnormal signal will not be output.) Operation of the ionizer does not stop when this phenomenon occurs. The ionizer will continue to operate with the ion balance data set during the last operation. (When the ionizer is operated for the first time after ex-factory, default is used.)

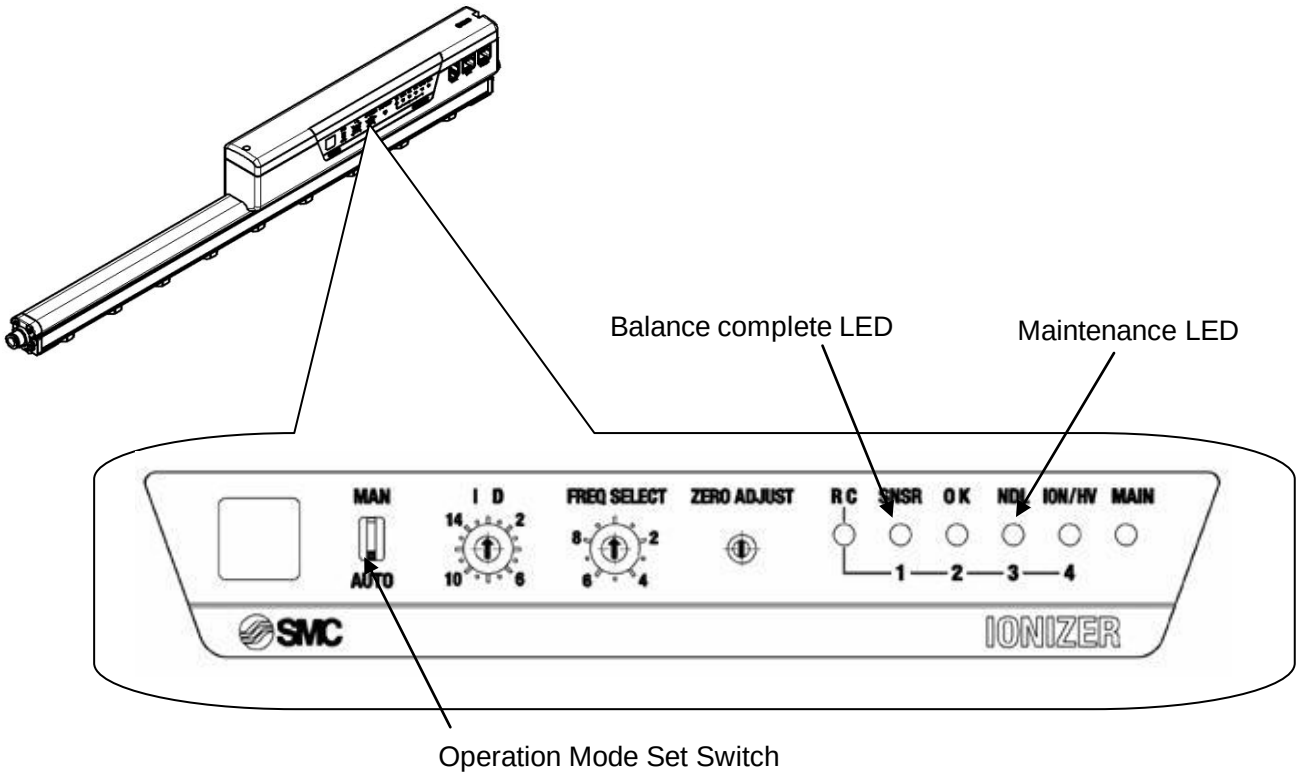
When the Operation Mode Set Switch is set to MAN, the balance adjusting trimmer is disabled.

	Maintenance (NDL) LED	Balance complete	Maintenance output
Balance being adjusted	Blinks	Turns OFF	OFF
Balance adjustment complete	Turns OFF	Turns ON	OFF
Balance adjustment incomplete	Turns ON	Turns OFF	ON

Data set by the manual operation can be released by setting the Operation Mode Set Switch to AUTO without connecting an external sensor. (Note that after releasing the data, the ionizer operates according to the setting by the balance adjusting trimmer.)

Auto balance sensor (high accuracy type) can be released after completing the manual operation.

When ion balance adjustment with higher accuracy is required, it is recommended that a measurement instrument, such as charge plate monitor be used then adjust manually.

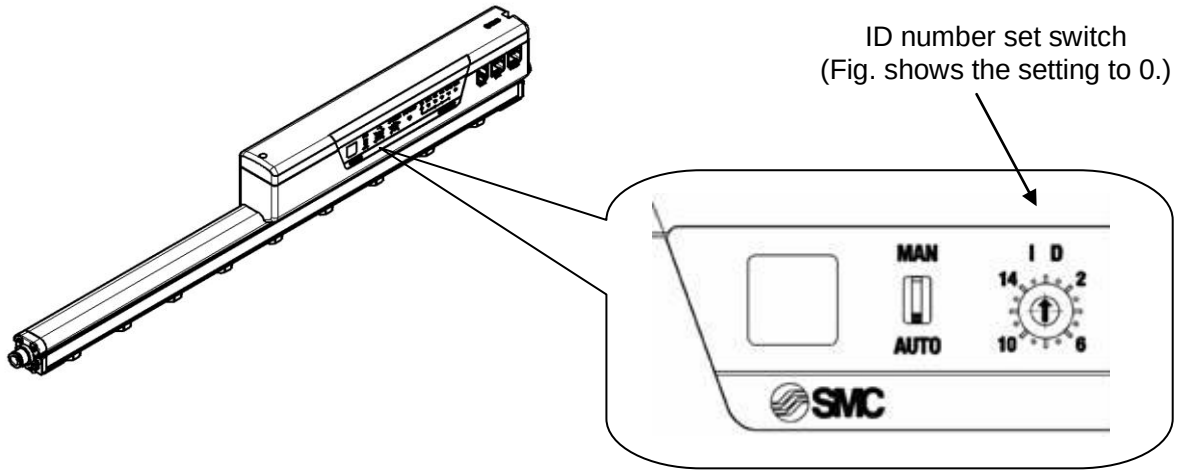


5-4. ID number settings

Applicable models: IZS41, IZS42

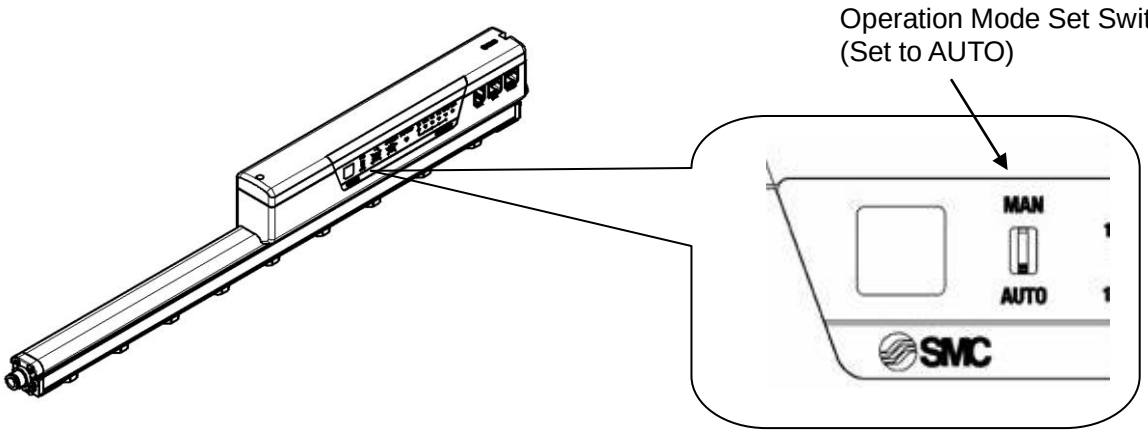
When more than one ionizer is installed in relatively close proximity to each other, ID numbers are set to identify the ionizers for set value change using a remote controller.

ID numbers from 0 to 15 can be set for a total of 16 ionizers. Use a rotary switch with an ID indicator setting.



5-5. Functions of the Operation Mode Set Switch

Applicable models: IZS41, IZS42



Operation Mode Set Switch of the ionizer is used to set the operation mode when auto balance sensor (high accuracy type) is connected. (It is set to AUTO as default.)

AUTO: Automatic operation
MAN: Manual operation

Refer to "5-1-2. Operation modes of IZS41" for details of automatic operation and manual operation.

5-6. Detection of contamination on the electrode

Models with contamination detection function: IZS41, IZS42

If the ionizer is used for a long time, contamination such as dust can stick to the electrodes, reducing the static electricity elimination performance. For this reason, IZS41 and IZS42 have a contamination detecting function.

Dirt detection is performed when a contamination detection signal from an electrode is input.

When the electrode requires cleaning due to deterioration of de-ionizing ability, the maintenance signal turns ON and maintenance LED also turns ON to notify the timing of cleaning. When the maintenance LED turns ON, make sure to clean the electrode. (Ionizer keeps operating even after the maintenance signal and maintenance LED turn ON.)

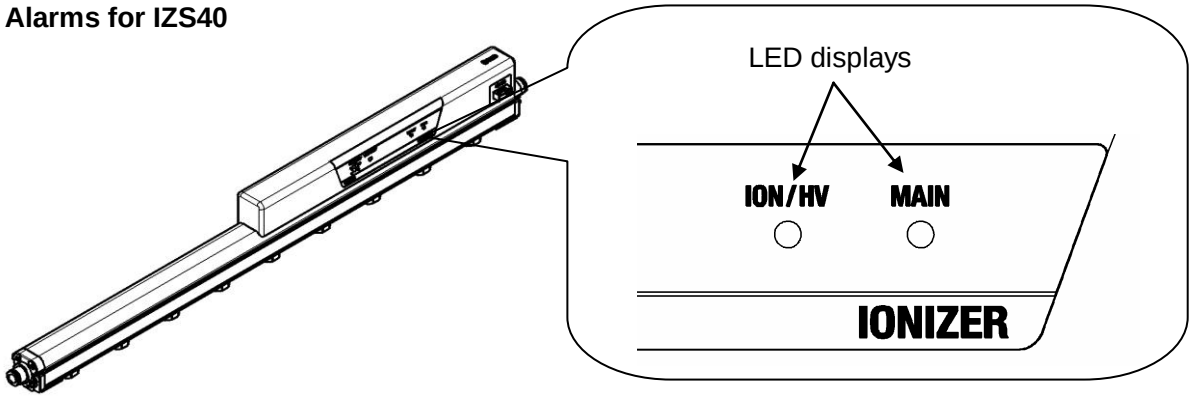
It is not possible to detect deterioration in de-ionizing ability only by connecting a feedback sensor (IZS41) or auto balance sensor (IZS41, IZS42). Input a contamination detection signal periodically to check the de-ionizing ability.

Dirt detection of electrodes should be performed without a workpiece, as it is performed with ions discharged from the ionizer at a regular cycle and this may electrify the workpiece.

5-7. Alarm function

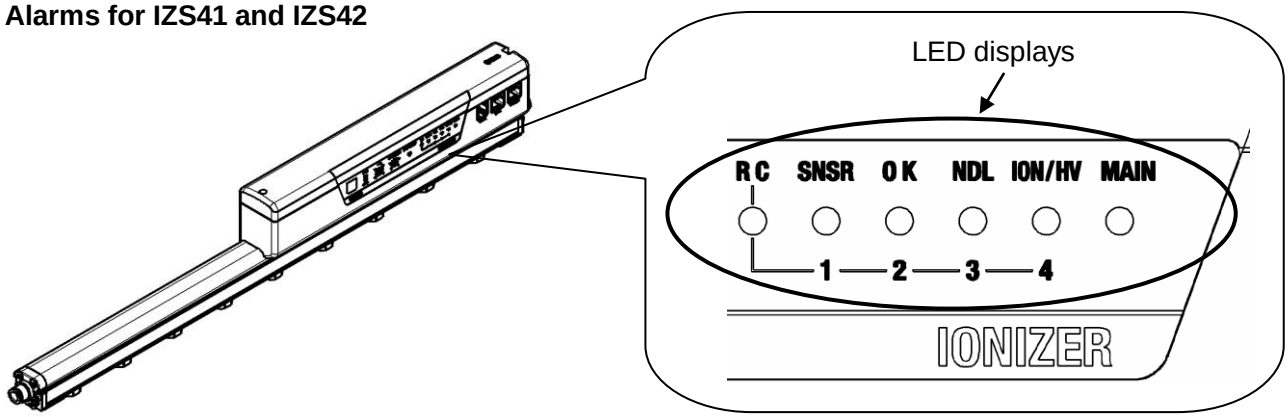
When an abnormality occurs while the ionizer is operating, an output signal or LED notification is generated. Depending on the content of abnormality, the ionizer either continues or stops operation.

5-7-1. Alarms for IZS40



Alarm name	LED ON	Blinking LED (Blinks at 1Hz)	Ionizer operation after generating alarm	Description	How to release error after recovery
Power supply failure	—	MAIN	Stop	When the power supply voltage in connection is outside of the specification.	Turn power off, then on again
Incorrect high voltage	ION / HV (Red)	—	Stop	When abnormal high voltage is discharged by error.	Turn power off, then on again
CPU operation failure	—	MAIN ION / HV(Red)	Stop	When CPU operates abnormally due to noise, etc.	Turn power off, then on again

5-7-2. Alarms for IZS41 and IZS42



Alarm name	Output signal	LED ON	Blinking LED (Blinks at 1Hz)	Ionizer operation after generating alarm	Description	How to release error after recovery
Maintenance	Maintenance signal	NDL	—	Continues	When ionizing performance deteriorates due to contamination or wearing of electrodes	Input ion discharge signal, and turn off the power and then on again.
Manual operation error	Maintenance signal	NDL	—	Continues	When the ionizer fails to adjust the ion balance in the fixed time	Input ion discharge signal, and turn off the power and then on again.
Output overcurrent	(Output from which overcurrent is detected is turned off.)	—	ION/HV (Green)	Continues	When overcurrent flows to the output circuit	Input ion discharge signal, and turn off the power and then on again.
Power supply failure	Abnormal (Contact B)	—	MAIN	Stop	When the power supply voltage in connection is outside of the specification	Turn power off, then on again
Incorrect high voltage	Abnormal (Contact B)	ION/HV(Red)	—	Stop	When abnormal high voltage is discharged by error	Input ion discharge signal, and turn off the power and then on again.
External sensor failure Note 1)	Abnormal (Contact B)	SNSR(Red)		Stop	When the connected sensor is damaged or has a broken cable	Turn power off, then on again
CPU operation failure	Abnormal (Contact B)	—	MAIN ION/HV(Red) NDL RC SNSR(Red) OK	Stop	When CPU operates abnormally due to noise, etc.	Turn power off, then on again

Note: When feedback sensor (for IZS41) or auto balance sensor (for IZS41 and IZS42) is connected.

5-7-3. Details of the alarms

1) Maintenance (Applicable models: IZS41, IZS42)

When electrodes are contaminated, worn, or damaged, notification is generated by outputting a maintenance signal and turning ON the NDL LED.

When electrode is contaminated, the abnormality can be solved by cleaning the electrode. When the electrode is worn or damaged, it is necessary to replace the electrode cartridge with a new one.

Ionizer does not stop after generating an alarm, and continues operation.

2) Abnormal manual operation (Applicable models: IZS41, IZS42)

When ion balance cannot be adjusted in a fixed period of time in manual operation mode using an auto balance sensor (high accuracy type), the abnormality will be notified by outputting a maintenance signal and turning ON the NDL LED.

The ion balance adjustment may have failed due to contamination, wear, or damage to the electrode, or ions discharged from the ionizer fail to reach the sensor due to objects placed around the sensor or ionizer.

Operation of the ionizer does not stop when this abnormality occurs. The ionizer keeps operating with the ion balance data set during the last operation. (When the ionizer is operated for the first time after ex-factory, default is used.)

To resolve the abnormality, resolve the above mentioned causes and perform the manual operation again, or set the Operation Mode Set Switch to AUTO with the external sensor removed. (Note that after releasing the data, the ionizer operates according to the setting by the balance adjusting trimmer.)

3) Output overcurrent (Applicable models: IZS41, IZS42)

When current which flows through the circuit exceeds that specified due to a load which is connected to the maintenance output or abnormal output being too small, output will be turned OFF to protect the output circuit, and the abnormality will be notified by blinking ION/HV (green).

To resolve the abnormality, check the circuit to be connected so that the current flowing to the output circuit is within the specification.

Ionizer does not stop after generating an alarm, and continues operation.

4) Power supply failure (Applicable models: IZS40, IZS41, IZS42)

When power supply which is connected to the ionizer is not within the range of 24V +/- 10%, abnormal signal output will be turned OFF (ON when it is normal), and the MAIN LED blinks.

To resolve the abnormality, connect a power supply which provides a power supply voltage of 24V +/- 10%, and supply power again.

5) Incorrect high voltage (Applicable models: IZS40, IZS41, IZS42)

When incorrect high voltage is discharged due to dew condensation or sticking of dust, etc., abnormal signal output will be turned OFF (ON when it is normal), and ION/HV turns ON red.

In order to clear the alarm, remedy the cause of the abnormal discharge and supply the power again.

6) External sensor failure (Applicable models: IZS41, IZS42)

When the cable of external sensor [Note)] is broken, abnormal signal output will be turned OFF (ON when it is normal), and SNSR LED will be turned ON red.

To solve the problem, remove the cause of the broken cable, and supply power again. When external sensor is broken, it needs to be replaced.

Note: Feedback sensor (for IZS41) or auto balance sensor (high accuracy type) (for IZS41 and IZS42)

7) CPU operation failure

When CPU makes an abnormal operation due to noise, etc., an abnormal signal output will be turned OFF (ON when it is normal), and MAIN, ION/HV (red), NDL, RC, SNSR (red) and OK LEDs blink.

Countermeasures against noise:

1) Position the ionizer away from the noise source.
2) Route the power line and cable of ionizer separately.
3) Install a noise filter to the power supply of the ionizer.

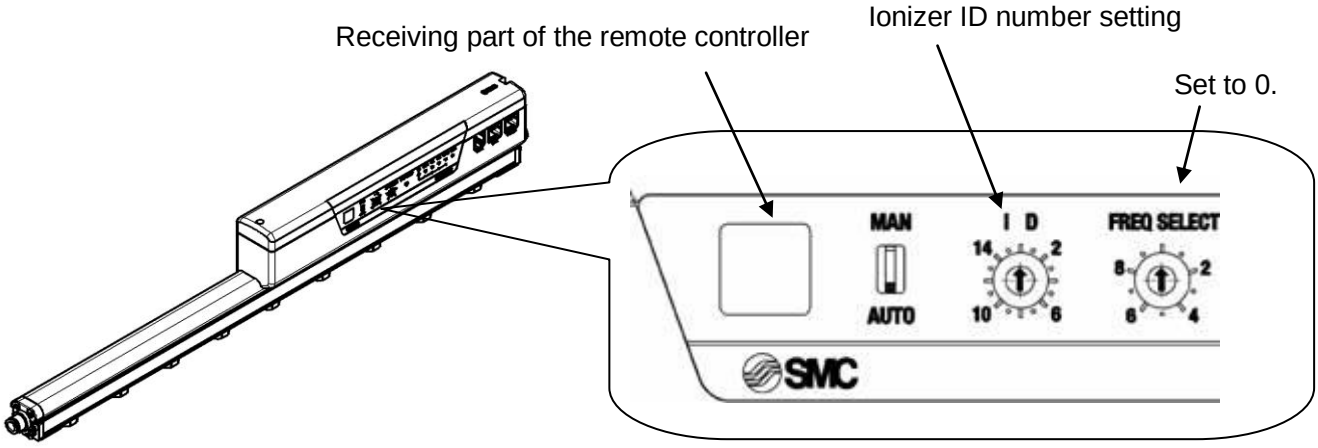
In order to clear the alarm, remedy the cause of the abnormality, and supply power again.

5-8. Remote controller

5-8-1. Outline

Applicable models: IZS41, IZS42

An infrared ray type remote controller is used for these models. Communication cannot be established if there are obstacles between the remote controller and ionizer. When operating with a remote controller, install the ionizer with the receiving part exposed, and point the sending part of the remote controller at the receiving part of the ionizer.



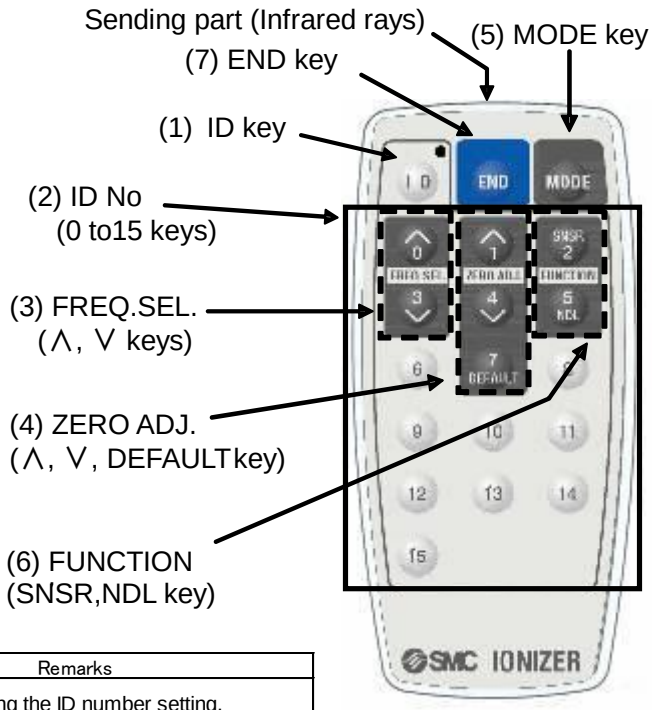
Maximum communication distance of the remote controller is 5 meters.

Before using the remote controller, set the FREQ SELECT indicator on the rotary switch of the ionizer to 0. When it is set to any value other than 0, remote controller cannot be used.

When the FREQ SELECT indicator on the rotary switch of the ionizer is set to 0, setting the balance adjusting trimmer with the indication of ZERO ADJUST is disabled.

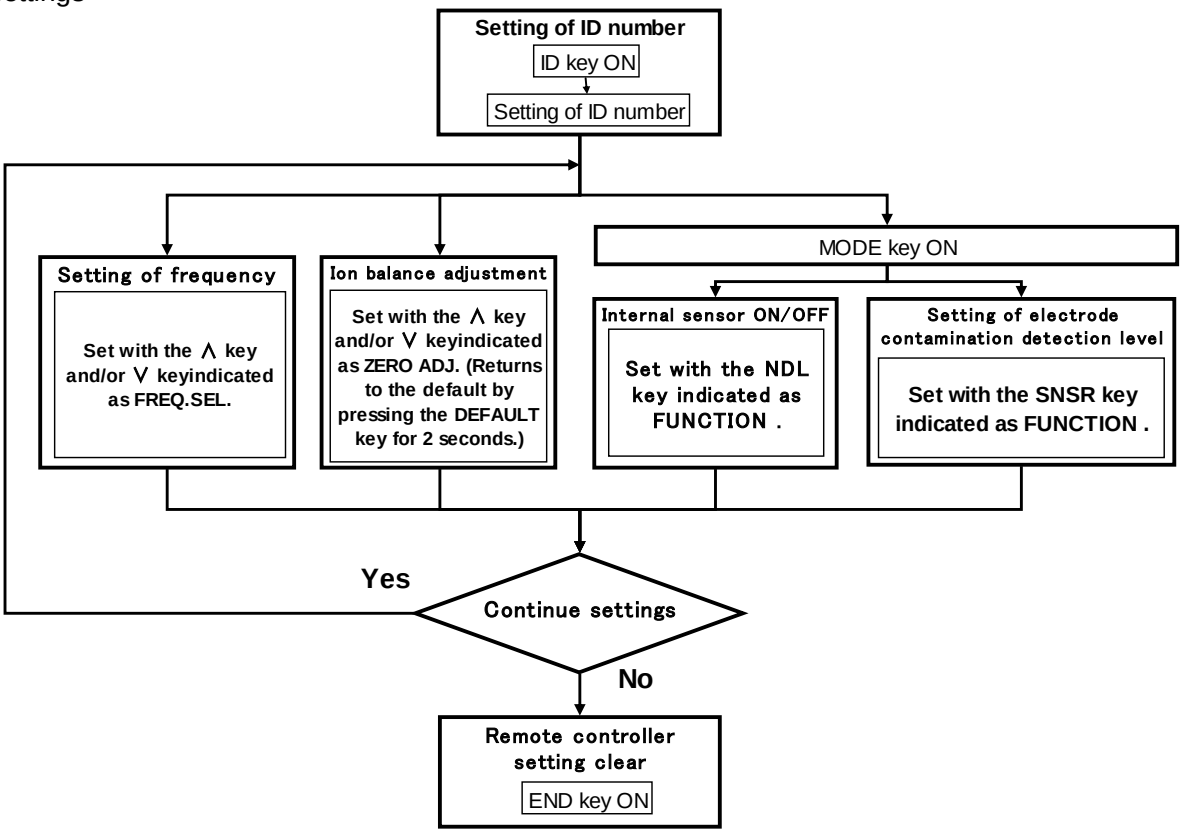
5 settings can be performed with the remote controller as shown below.

1) ID number setting
2) Frequency setting
3) Ion balance adjustment
4) Internal sensor ON/OFF
5) Dirt detection alarm setting



No.	Description	Key name	Remarks
(1)	ID number setting	ID key	Input when enabling the ID number setting.
(2)		ID numbers (Keys 0 to 15)	Sets the ID number. Not operable when the ID key is OFF (LED of the ID key should be ON).
(3)	Setting of frequency	FREQ.SEL. (∧ and ∨ keys)	Sets the ion generating frequency of the ionizer.
(4)	Ion balance adjustment	ZERO ADJ. (∧, ∨, DEFAULT keys)	Used for ion balance adjustment. Returns to the default adjustment by pressing the DEFAULT key for 2 seconds.
(5)	Internal sensor ON/OFF Setting of electrode contamination detecting level	MODE key	Input when enabling the FUNCTION input.
(6)		FUNCTION (SNSR , NDL keys)	SNSR key: Sets the internal sensor ON/OFF. NDL key: Sets the electrode contamination
(7)	Remote controller setting clear	END key	Inputs to clear the communication with the ionizer.

Flow of settings



5-8-2. Operation with remote controller

Before performing settings with a remote controller, make sure to set the same ID number as the ionizer to be controlled to the remote controller, and enable the communication.

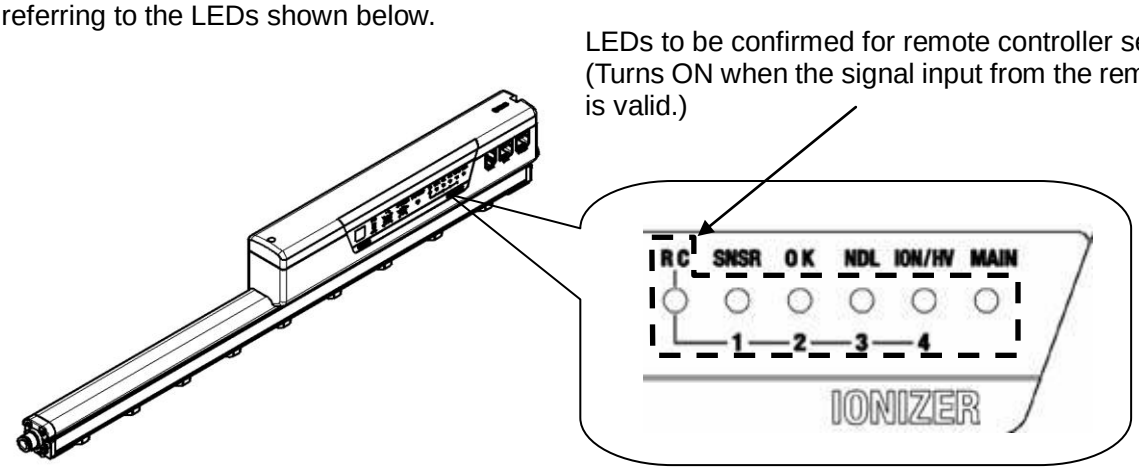
If the ID number is not set, it is not possible to perform settings with the remote controller.

When the remote controller and ionizer are ready for communication, RC of the ionizer LEDs turns ON, and it blinks every time it receives a signal from the remote controller.

After completing settings with the remote controller, cancel the communication between the remote controller and ionizer. It is not possible to start operation of the ionizer until communication is canceled. (Without any signal received to the ionizer from the remote controller for 30 seconds, communication will be canceled automatically.)

When communication is canceled, RC of the ionizer LEDs will be turned OFF.

When changing settings with the remote controller, confirm that the signal is securely received by the ionizer with referring to the LEDs shown below.

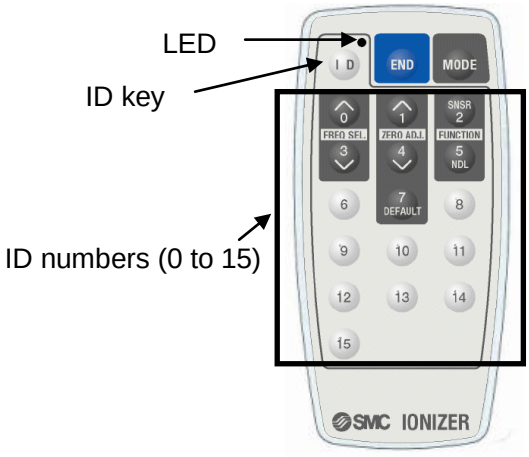


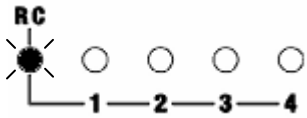
1) ID number setting

For ID number setting, press the ID key of the remote controller, and then, press the ID number from 0 to 15 to set.

When the ID key is pressed, an LED on the upper right of the key turns ON, and it turns OFF when the ID number is set.

For the LED indication of the ionizer, the LED indicated as RC of the ionizer which is now ready to communicate turns ON.





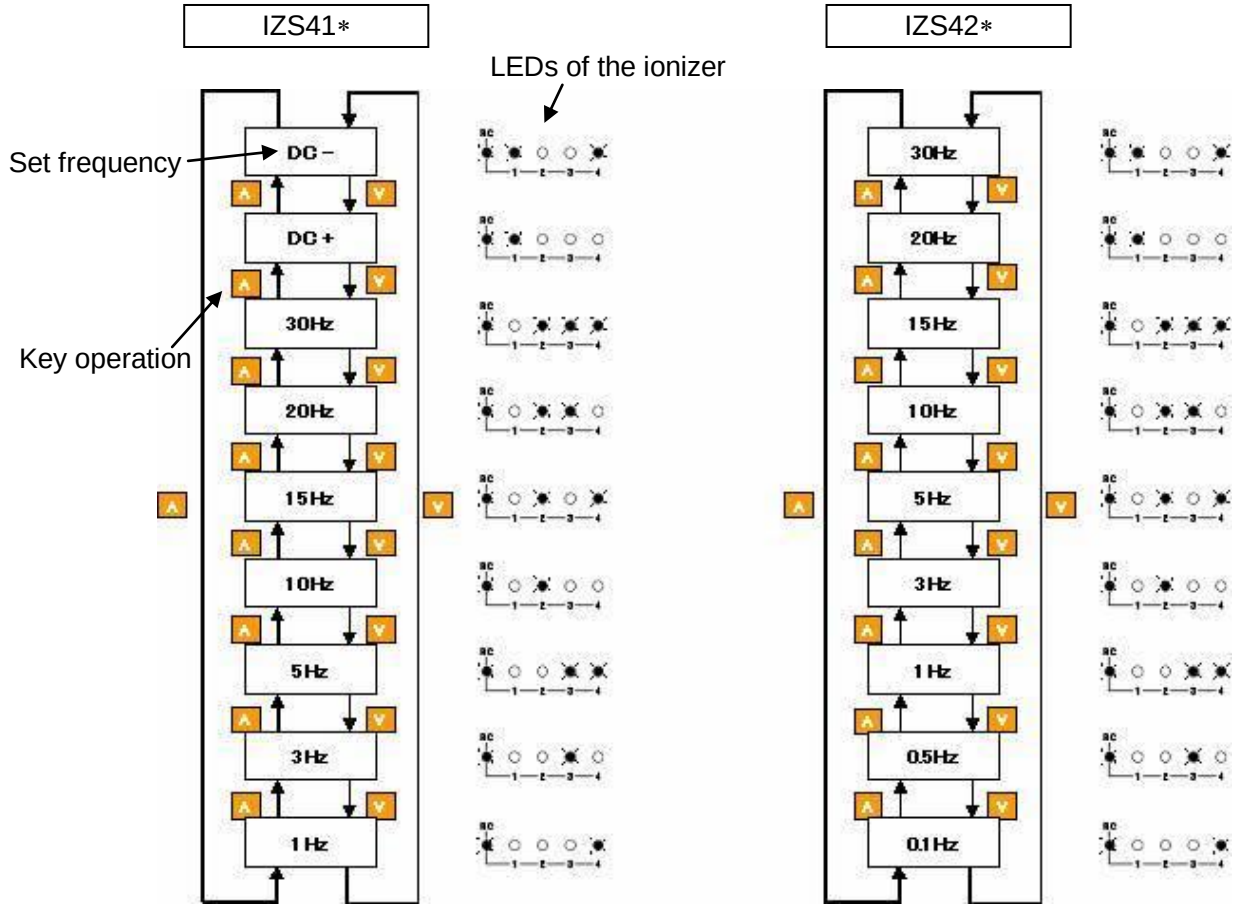
LEDs of the ionizer

2) Frequency setting (Default: 30Hz)

Use the ∧ key or ∨ key with the indication of FREQ.SEL. to set frequency.

Frequency will be higher by pressing the ∧ key, and it will be lower by pressing the ∨ key.

Ionizer LEDs from 1 to 4 turns ON or OFF according to the set frequency, and RC LED turns ON when no signal is received from the remote controller, and blinks when a signal is received from the remote controller. Refer to the diagram shown below for details.



3) Ion balance adjustment

Ion balance can be adjusted using the ∧ key or ∨ key with an indication of **ZERO ADJ**.

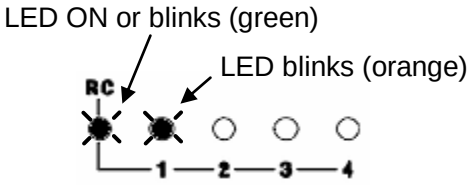
Pressing ∧ key increases positive ions (LED 1 blinks), and pressing ∨ key increases negative ions (LED 4 blinks). When it reaches the adjusting limit, the ionizer LED 1 turns ON for the positive limit, and LED 4 turns ON for the negative limit.

By pressing the **DEFAULT** key for 2 seconds or more, it returns to the default ion balance, and LED 1 and LED 4 turn OFF after blinking.

RC LED turns ON when no signal is received from the remote controller, and blinks when a signal is received.

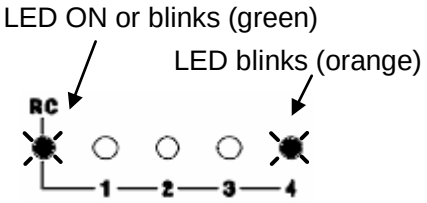
When performing adjustment of ion balance, use a measuring instrument such as a charge plate monitor.

When adjusting positive ions



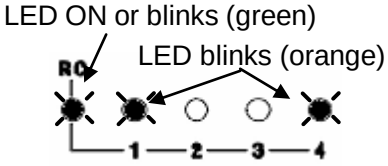
LEDs of the ionizer

When adjusting negative ions



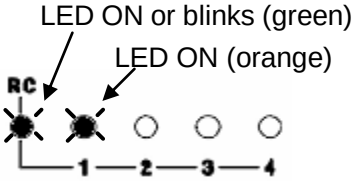
LEDs of the ionizer

Default



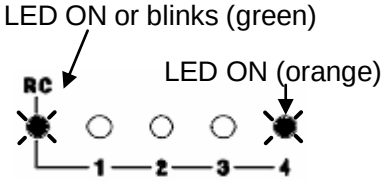
LEDs of the ionizer

At the adjustment limit for positive ions



LEDs of the ionizer

At the adjustment limit for negative ions



LEDs of the ionizer

4) Internal sensor ON/OFF (Default: ON)

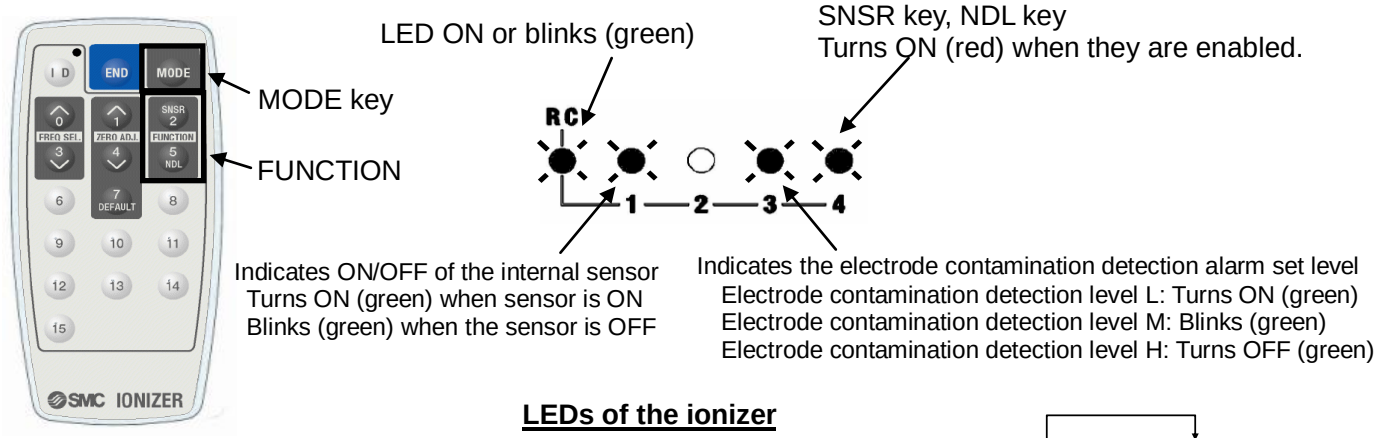
Internal sensor can be switched ON/OFF with the **MODE** key and **SNSR** key which is indicated as **FUNCTION**.

Pressing the **MODE** key enables the **SNSR** key, and the internal sensor is turned ON/OFF every time the **SNSR** key is pressed.

For the ionizer LEDs, when the **FUNCTION** keys are enabled by pressing the **MODE** key, LED 4 turns ON red. LED1 turns ON green when the internal sensor is enabled, and LED 1 turns OFF when it is disabled, when the **SNSR** key is pressed.

LED 3 turns ON, blinks or OFF depending on the setting of the contamination detection alarm.

RC LED (green) turns ON when no signal is received from the remote controller, and blinks when a signal is received.

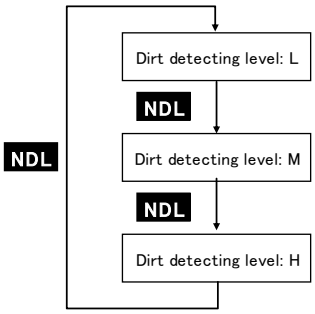


LEDs of the ionizer

5) Electrode contamination detection alarm setting (Default level: L)

Settings of the electrode contamination detection alarm can be performed with the **MODE** key and **NDL** key which is indicated as **FUNCTION**.

NDL key is enabled by pressing the MODE key. Every time the NDL key is pressed, the electrode contamination detecting level is changed from L (low), M (middle), and to H (high) in turn.



Electrode contamination detecting level L: Time required for de-ionization will be longer compared with the early stage

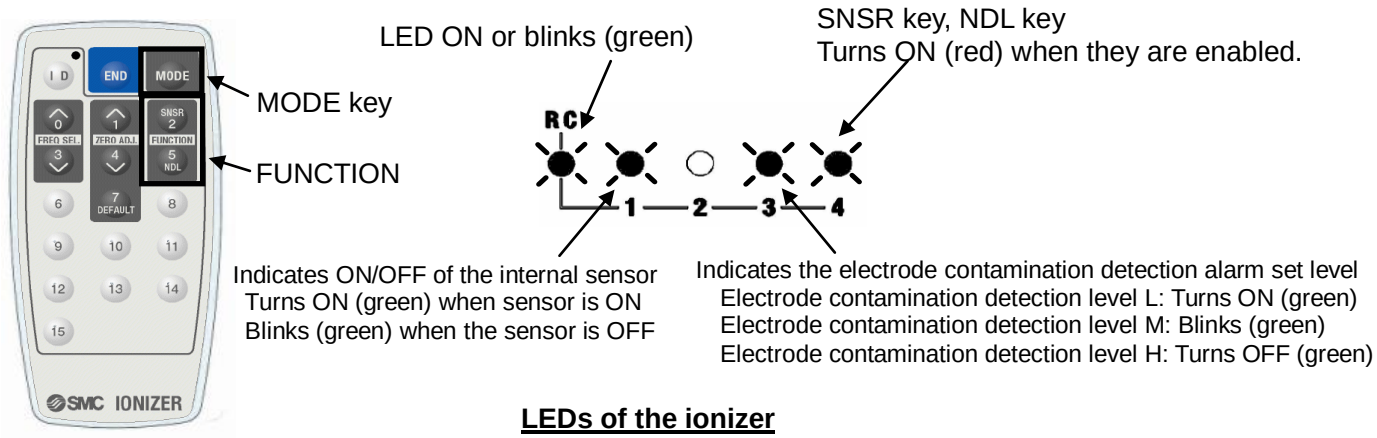
Electrode contamination detecting level M: Time required for de-ionization begins to be longer

Electrode contamination detecting level H: No influence is given to the time required for de-ionization

When **MODE** key is pressed and **FUNCTION** keys are enabled, LED 4 turns ON red. For electrode contamination detecting level L, LED 3 turns ON (green) when the **NDL** is pressed. LED 3 (green) blinks when the contamination detection level is set to M, and LED 3 turns OFF when the contamination detection level is H.

LED 1 turns ON when the internal sensor is enabled, and blinks when it is disabled.

RC LED (green) turns ON when no signal is received from the remote controller, and blinks when a signal is received.



LEDs of the ionizer

6) Communication cancellation with ionizer

Use **END** key to cancel the communication.

Communication between the remote controller and ionizer can be canceled by pressing the **END** key. (Without any signal received to the ionizer from the remote controller for 30 seconds, communication will be canceled automatically.)

6. Performance

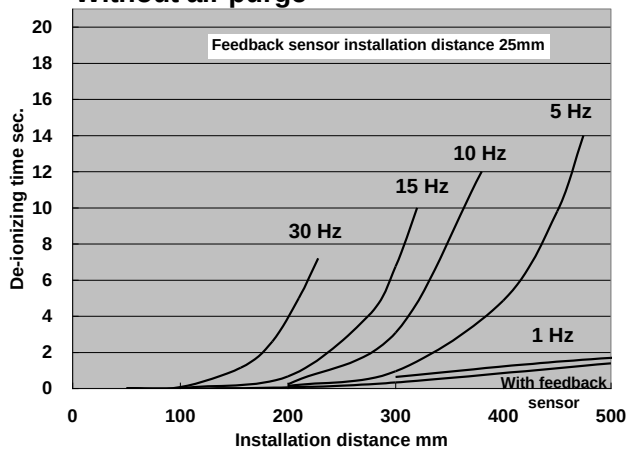
Performance data shown in this chapter is based on an electrified plate (dimensions: 150 x 150mm, electrostatic capacity: 20pF) defined by ANSI standard (ANSI/ESD STM3.1-2006). Use this data as a guideline for selection, as the performance data may vary depending on the material and size of the workpiece.

6-1. Installation distance and de-ionization time (Electricity elimination from 1000V to 100V)

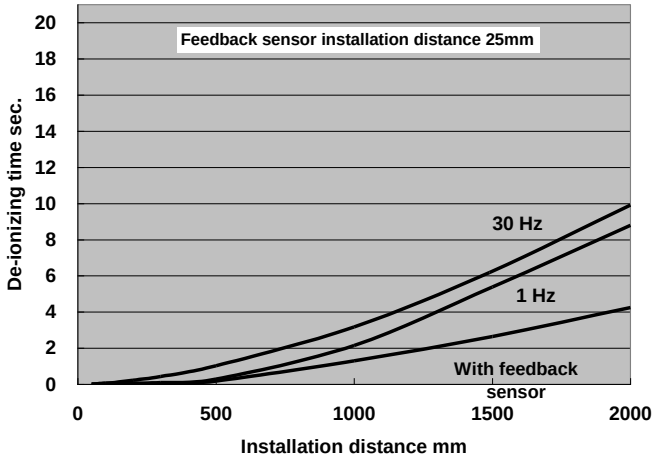
Applicable models: IZS40, IZS41

(Data of an ionizer with IZS41 sensor with a feedback sensor installed at a distance of 25mm from the sensor to a workpiece.)

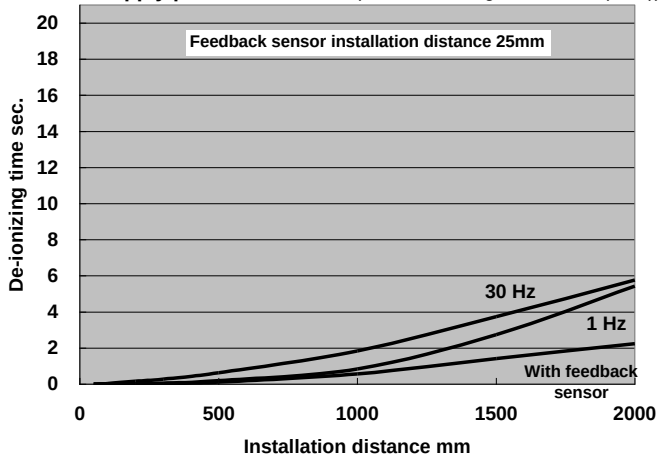
Without air purge



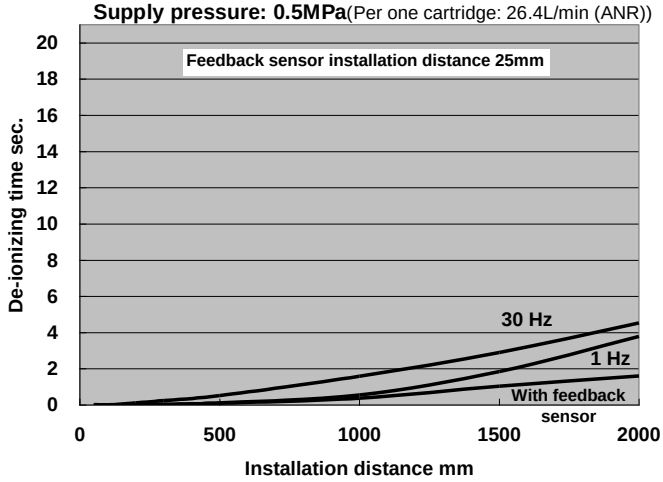
With high speed de-ionization cartridge, Supply pressure: 0.1MPa (Per one cartridge: 8.6L/min (ANR))



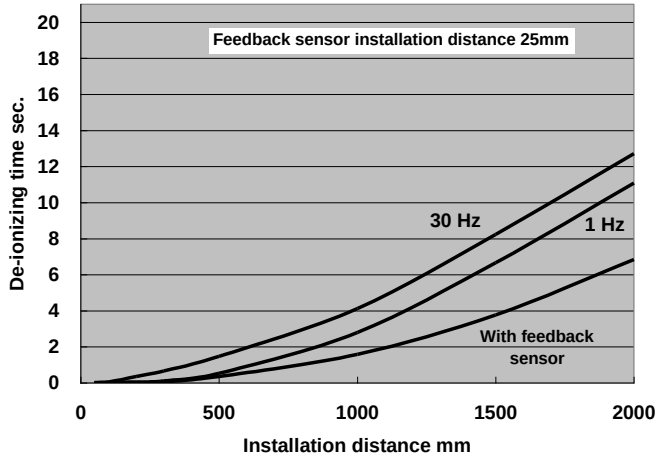
With high speed de-ionization cartridge, Supply pressure: 0.3MPa (Per one cartridge: 17.6L/min (ANR))



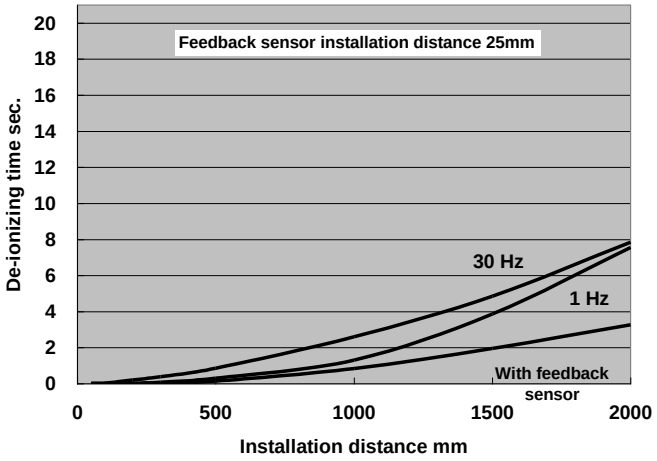
With high speed de-ionization cartridge, Supply pressure: 0.5MPa(Per one cartridge: 26.4L/min (ANR))



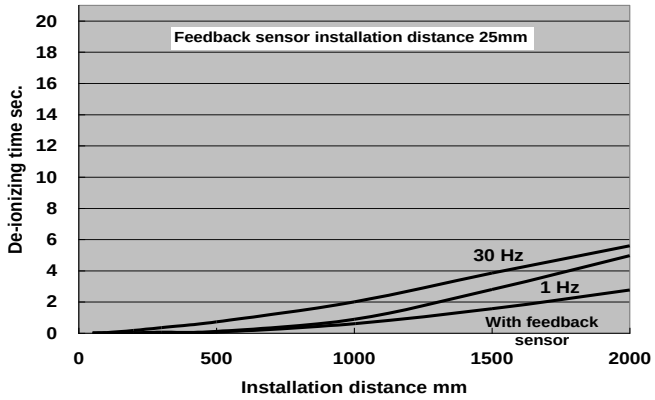
With energy saving type de-ionization cartridge, Supply pressure: 0.1MPa (Per one cartridge: 4.3L/min (ANR))



With energy saving type de-ionization cartridge, Supply pressure: 0.3MPa (Per one cartridge: 8.6L/min (ANR))

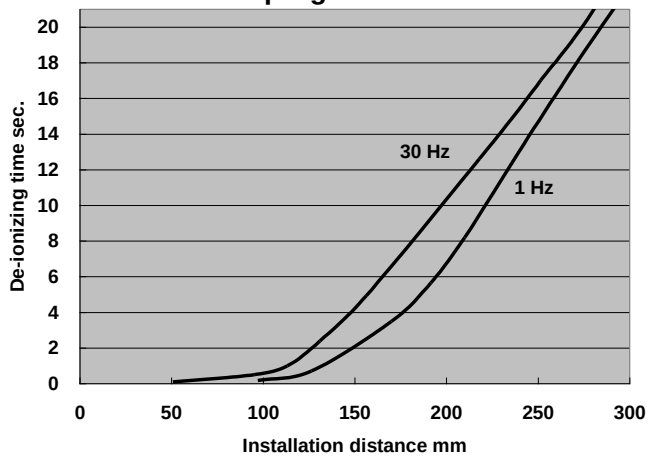


With energy saving type de-ionization cartridge,
Supply pressure: 0.5MPa (Per one cartridge: 13.3L/min (ANR))

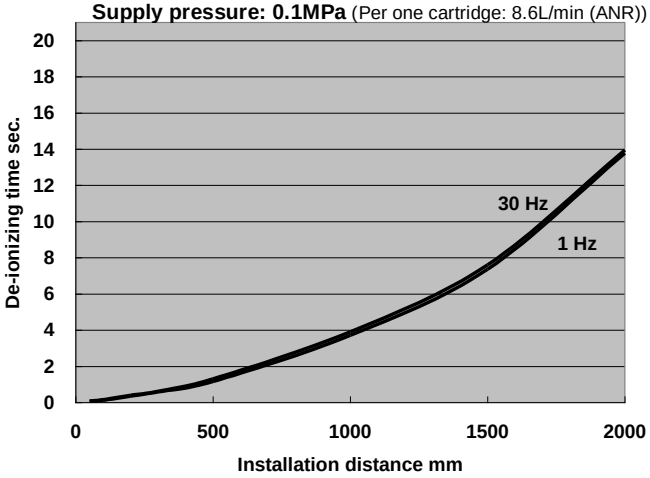


Applicable model: IZS42

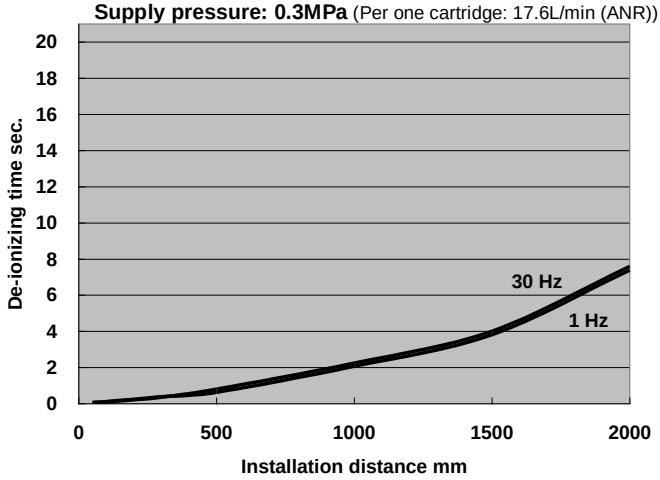
Without air purge



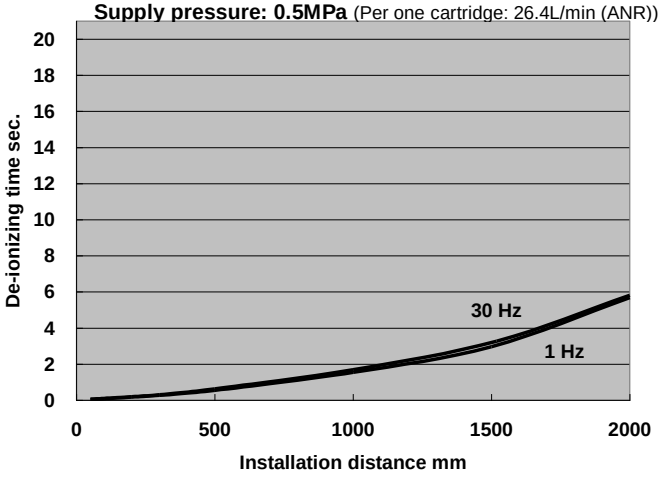
With high speed de-ionization cartridge,
Supply pressure: 0.1MPa (Per one cartridge: 8.6L/min (ANR))



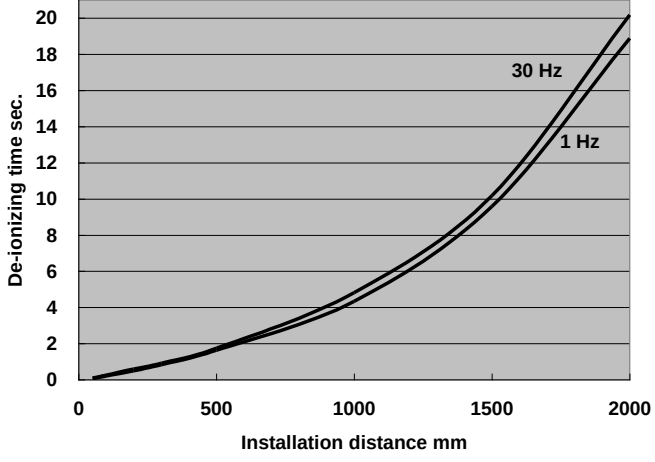
With high speed de-ionization cartridge,
Supply pressure: 0.3MPa (Per one cartridge: 17.6L/min (ANR))



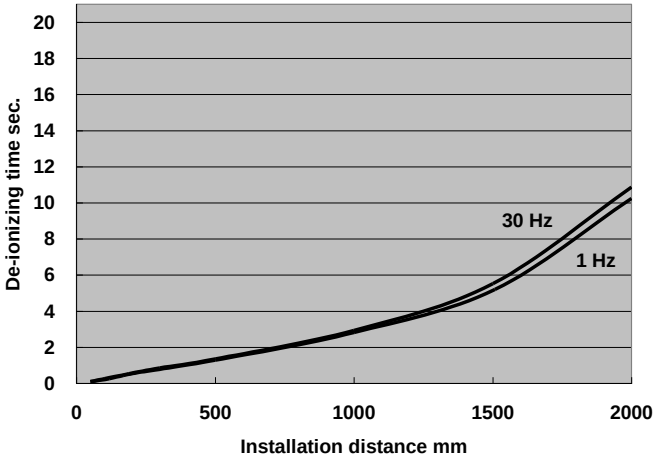
With high speed de-ionization cartridge,
Supply pressure: 0.5MPa (Per one cartridge: 26.4L/min (ANR))



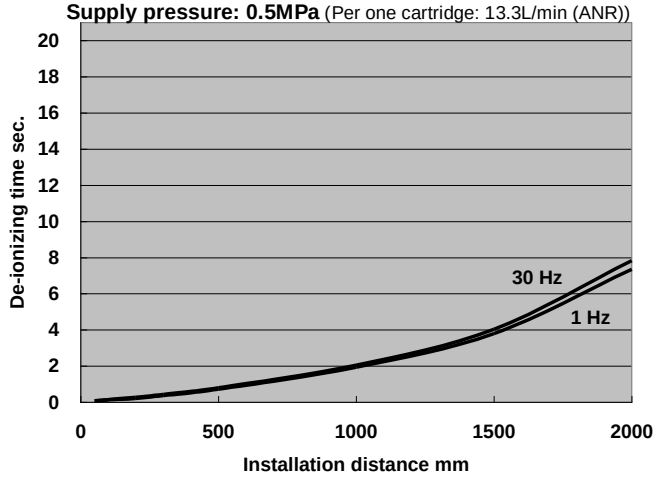
With energy saving type de-ionization cartridge,
Supply pressure: 0.1MPa (Per one cartridge: 4.3L/min (ANR))



With energy saving type de-ionization cartridge,
Supply pressure: 0.3MPa (Per one cartridge: 8.6L/min (ANR))



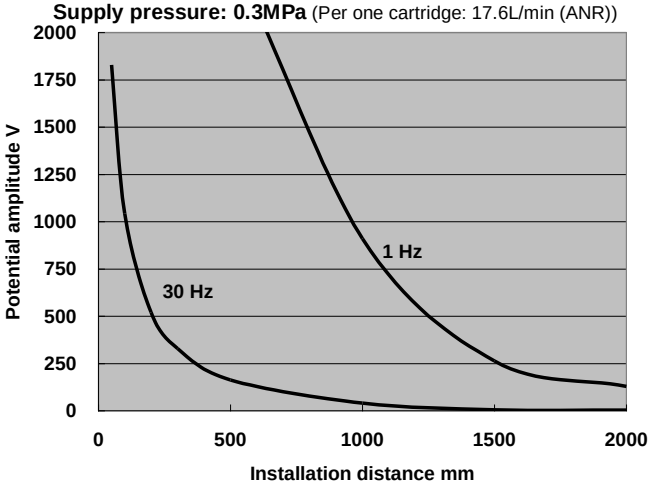
With energy saving type de-ionization cartridge,
Supply pressure: 0.5MPa (Per one cartridge: 13.3L/min (ANR))



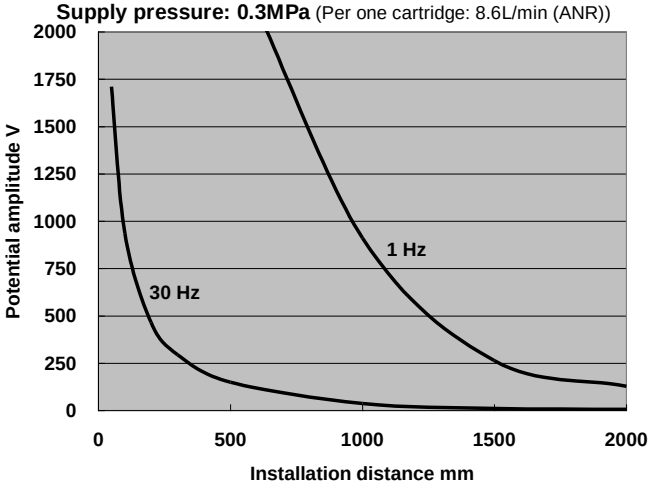
6-2. Potential amplitude

Applicable models: IZS40, IZS41

With high speed de-ionization cartridge,
Supply pressure: 0.3MPa (Per one cartridge: 17.6L/min (ANR))

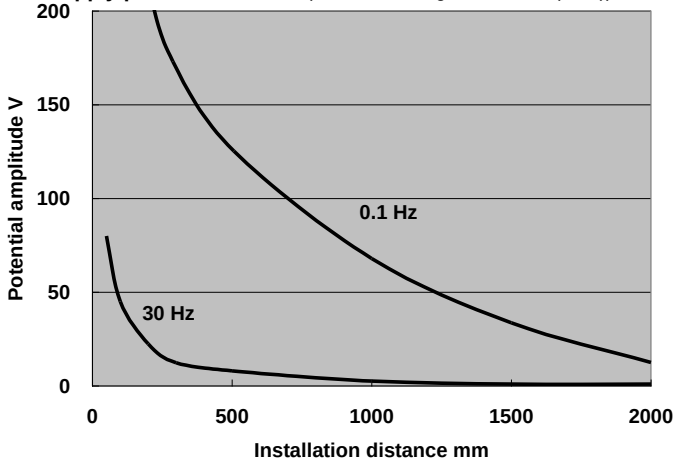


With energy saving type de-ionization cartridge,
Supply pressure: 0.3MPa (Per one cartridge: 8.6L/min (ANR))

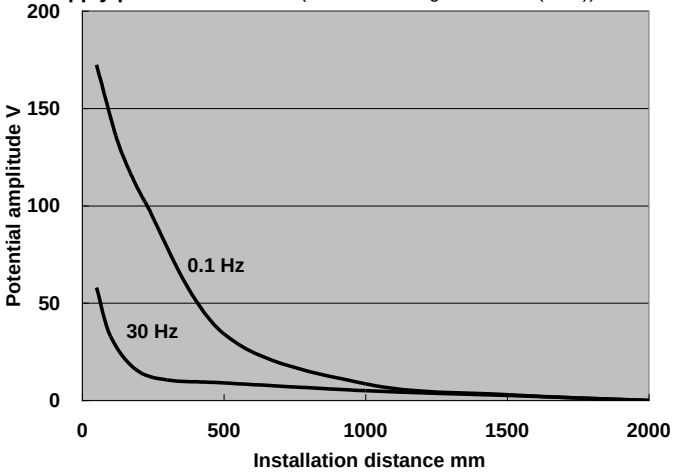


Applicable model: IZS42

With high speed de-ionization cartridge,
Supply pressure: 0.3MPa (Per one cartridge: 17.6L/min (ANR))



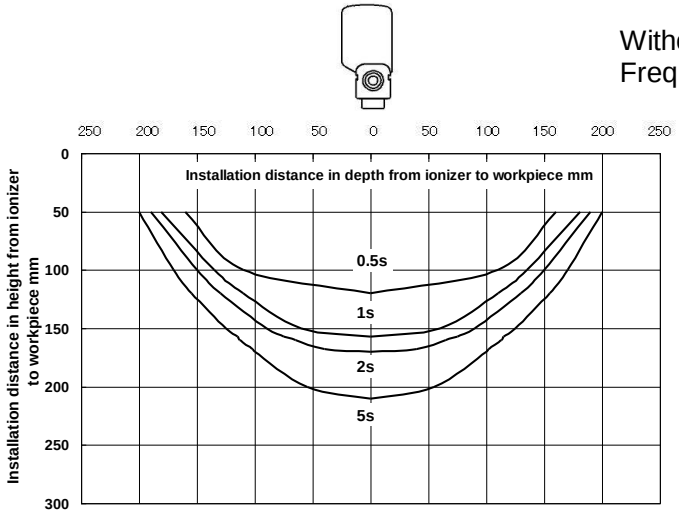
With energy saving type de-ionization cartridge,
Supply pressure: 0.3MPa (Per one cartridge: 8.6L/min (ANR))

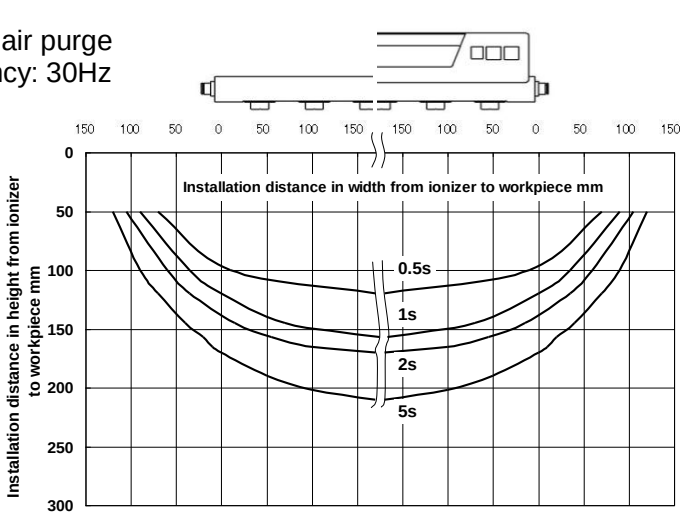


6-3. De-ionizing range

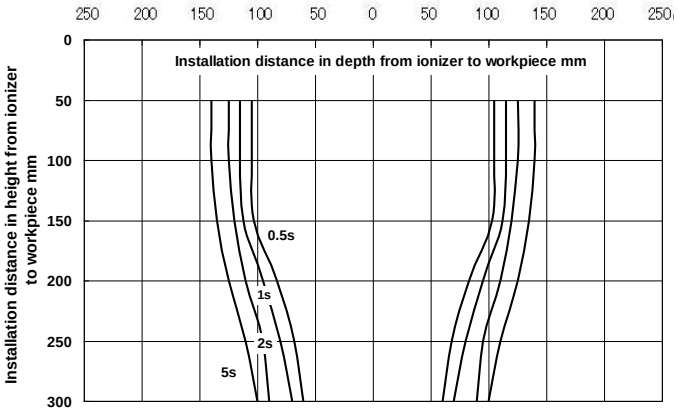
Applicable models: IZS40, IZS41

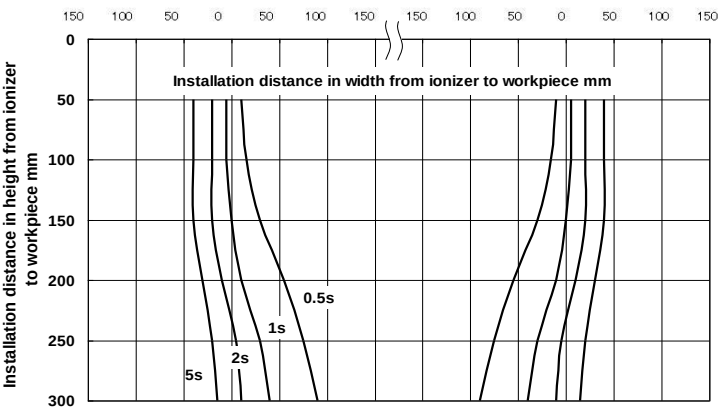
Without air purge
Frequency: 30Hz



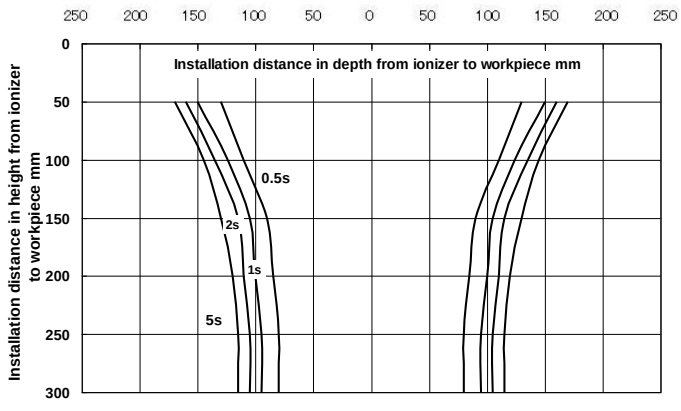


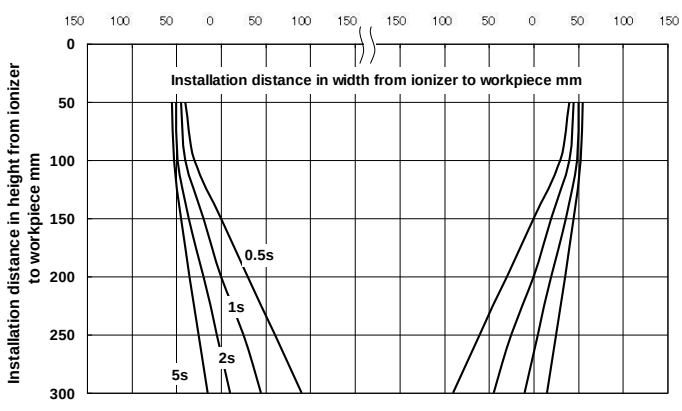
With high speed de-ionizing cartridge
Supply pressure: 0.3 MPa
(17.6L/min(ANR) per one cartridge)
Frequency: 30Hz



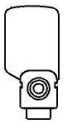


With energy saving type de-ionizing cartridge
Supply pressure: 0.3 MPa
(8.6L/min(ANR) per one cartridge)
Frequency: 30Hz

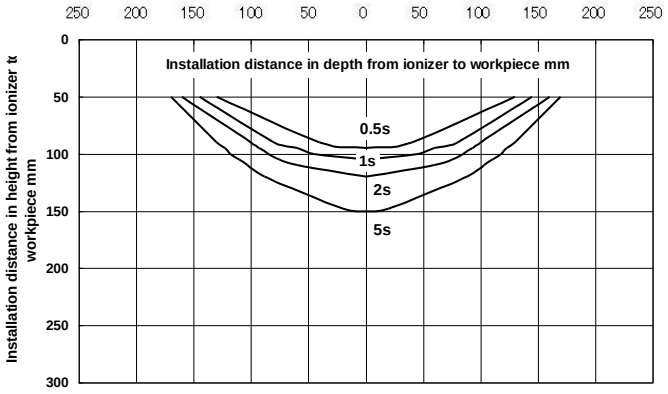


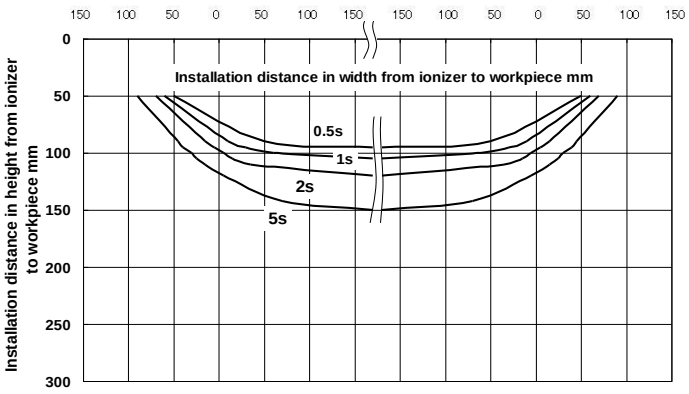


Applicable model: IZS42

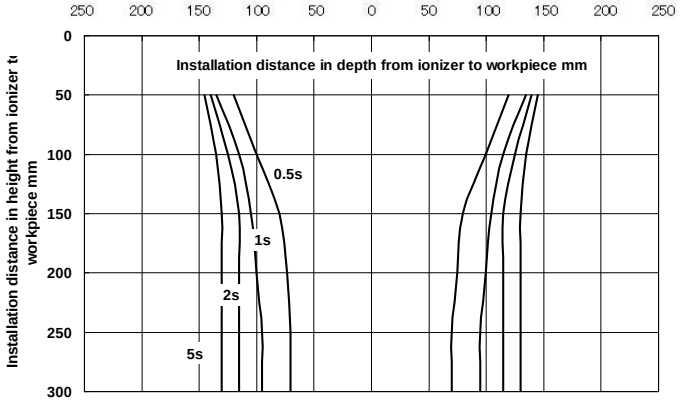


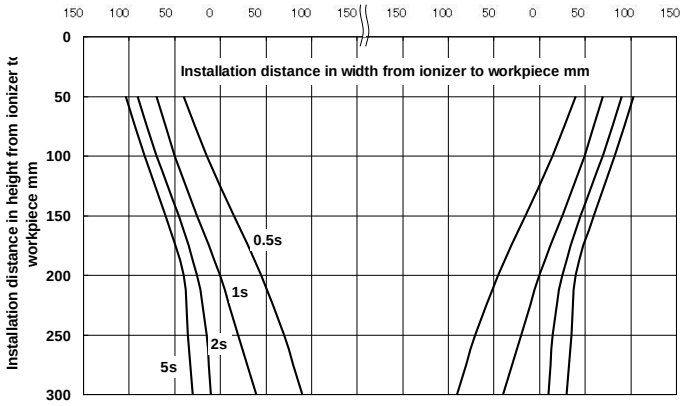
Without air purge
Frequency: 30Hz



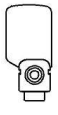


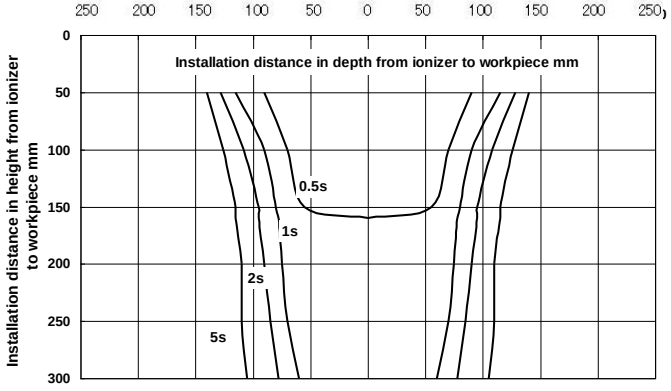
With high speed de-ionizing cartridge
Supply pressure: 0.3 MPa
(17.6L/min(ANR) per one cartridge)
Frequency: 30Hz

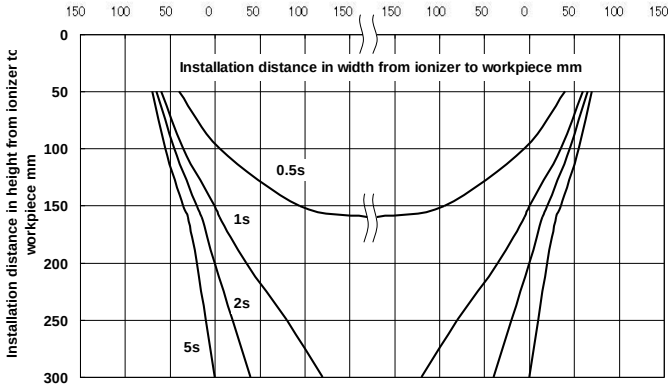




With energy saving type de-ionizing cartridge
Supply pressure: 0.3 MPa
(8.6L/min(ANR) per one cartridge)
Frequency: 30Hz







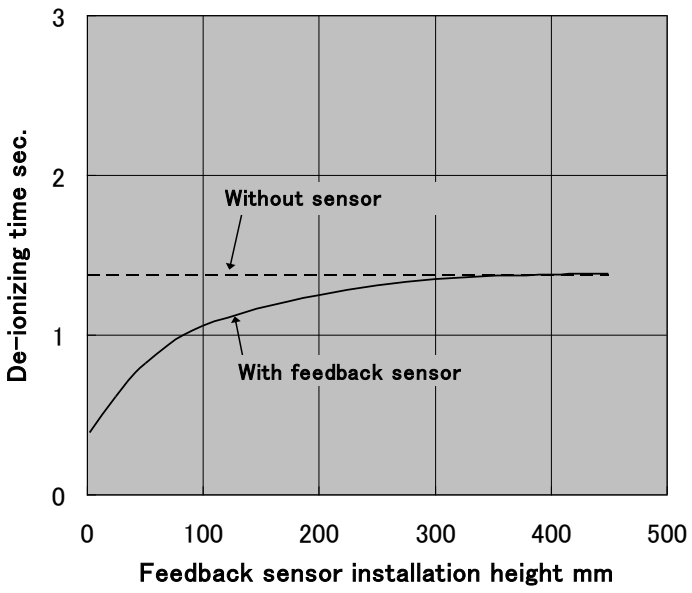
6-4. De-ionizing time and ion balance at installation levels of feedback sensor

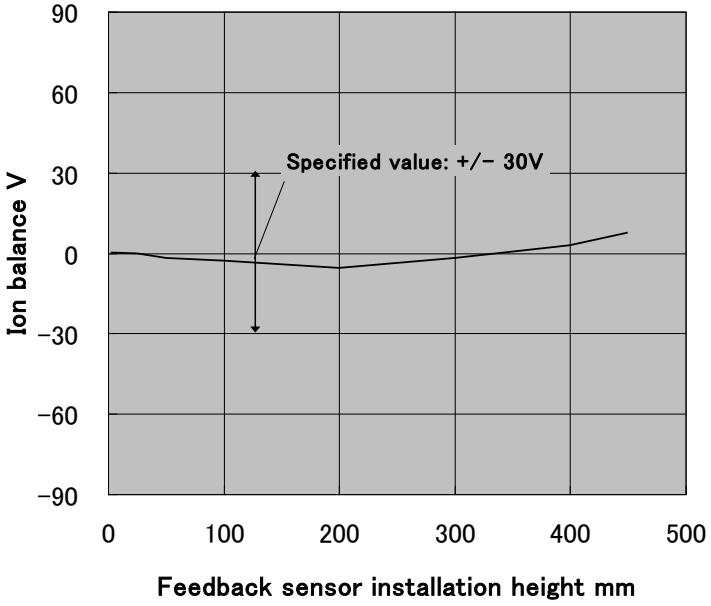
Applicable model: IZS41

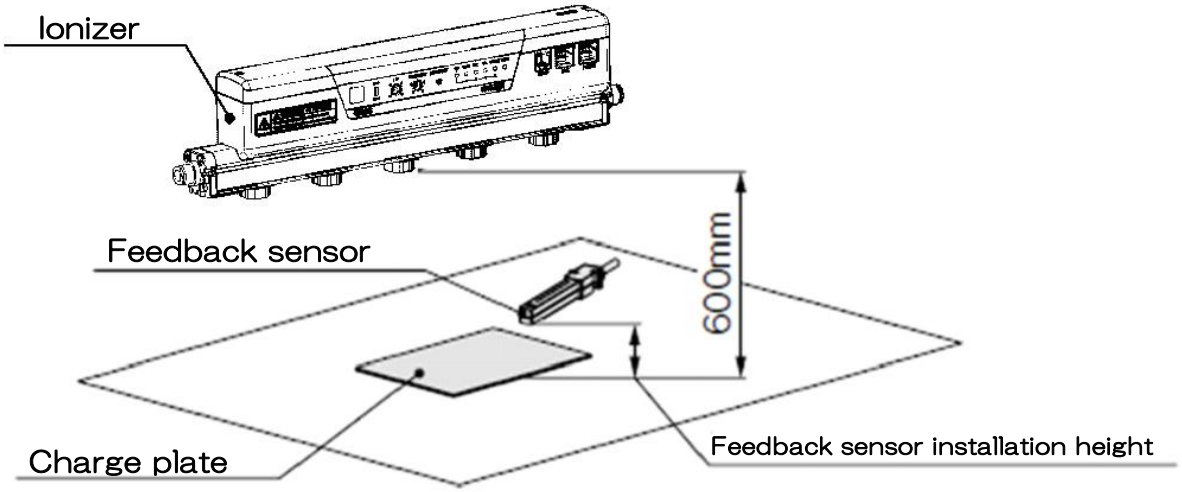
It is recommended to install a feedback sensor at a level of 50mm or less. However, if the sensor is installed at a higher level than recommended, use the data shown below as reference.

I

With high speed de-ionizing cartridge, Supply pressure: 0.1 MPa
(Per one cartridge: 8.6L/min (ANR))
Frequency: 30Hz
Ionizer installation distance: 600mm

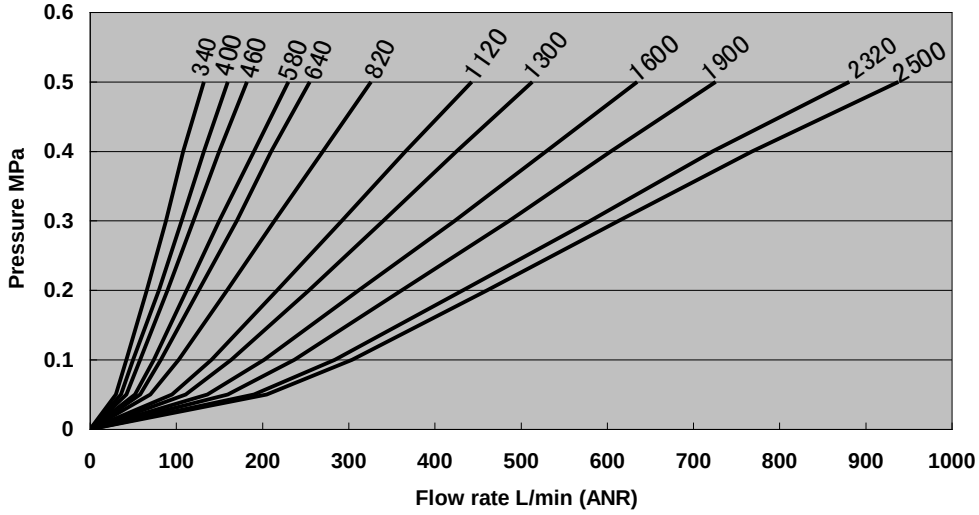




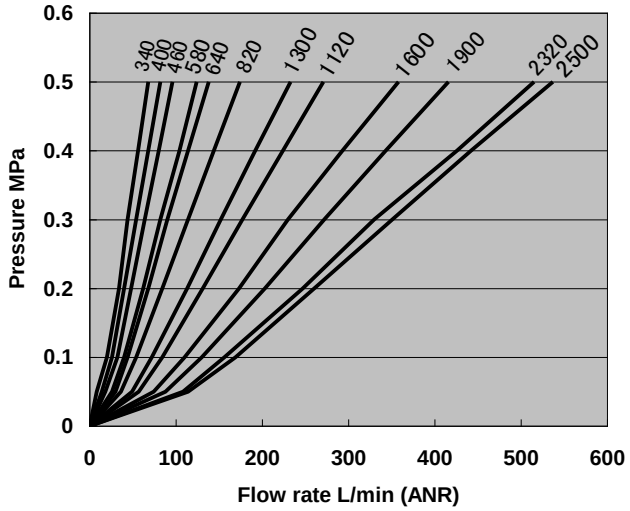


6-5. Flow - Pressure characteristics

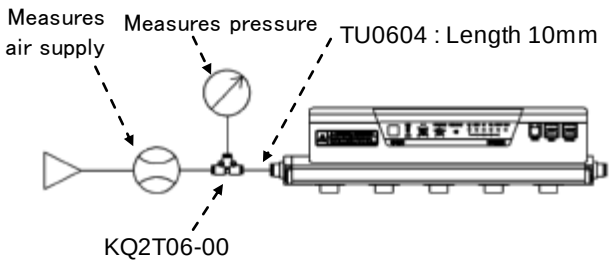
With high speed de-ionizing cartridge



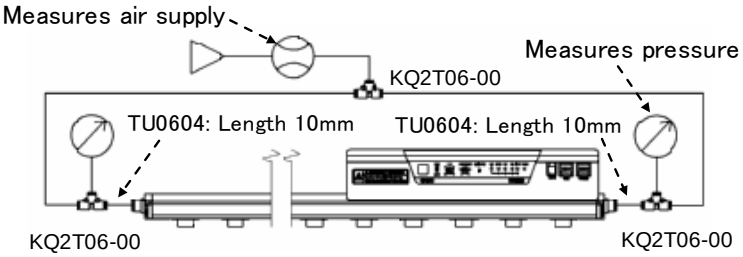
With energy saving type de-ionizing cartridge



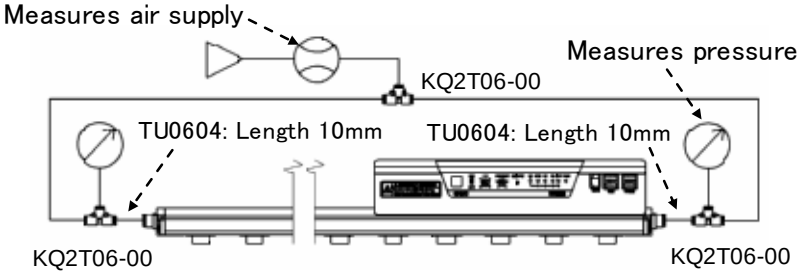
Measuring method schematic



(a) Air supply from one side
(IZS4∗-340/ 400/ 460/ 580/ 640)



(b) Air supply from both sides
(IZS4∗-820/ 1120/ 1300)



(c) Air supply from both sides
(IZS4∗-1600/ 1900/ 2320/ 2500)

7. Dimensions

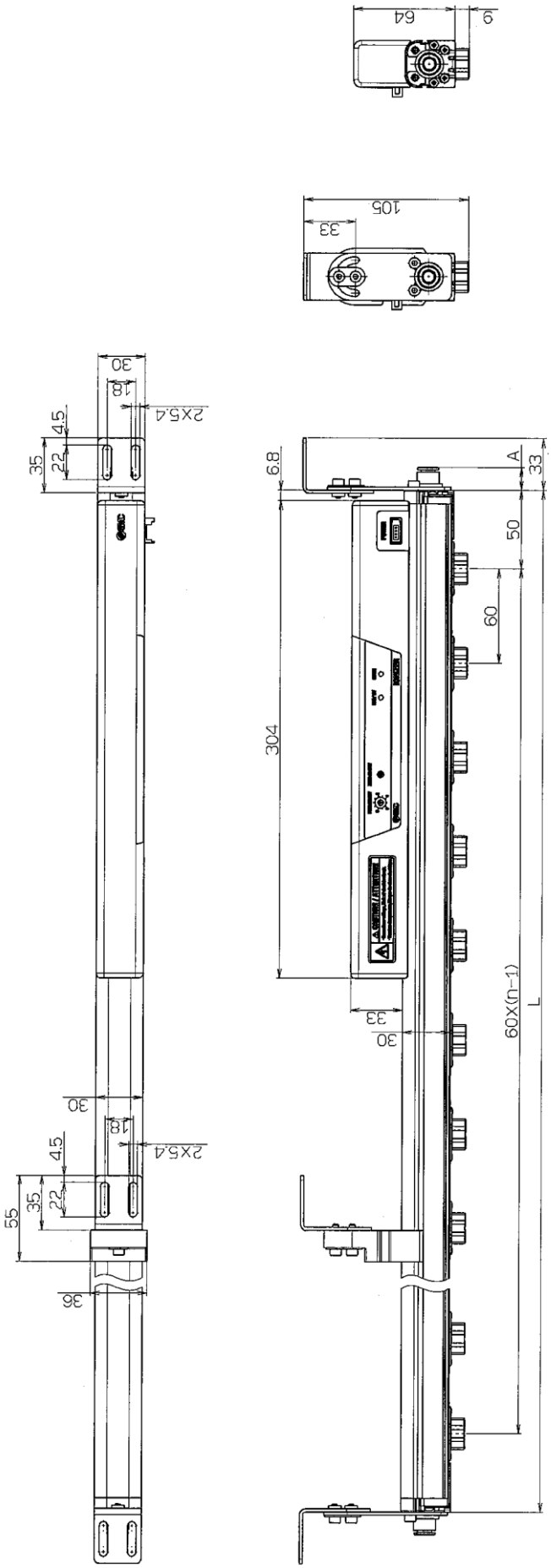
Ionizer/ IZS40

n (No. of cartridge), L

Model	Symbol for bar length	n	L
IZS40	340	5	340
	400	6	400
	460	7	460
	580	9	580
	640	10	640
	820	13	820
	1120	18	1120
	1300	21	1300
	1600	26	1600
	1900	31	1900
	2320	38	2320
	2500	41	2500

A

Symbol for fitting	A (mm)
06	13
08	15
10	22

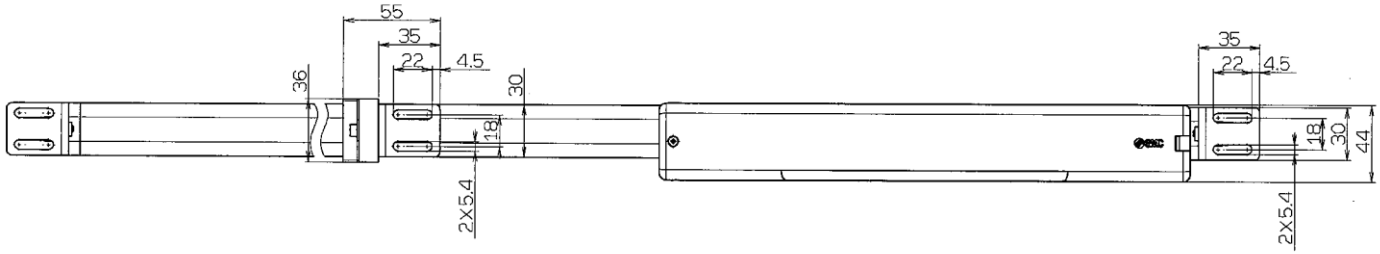


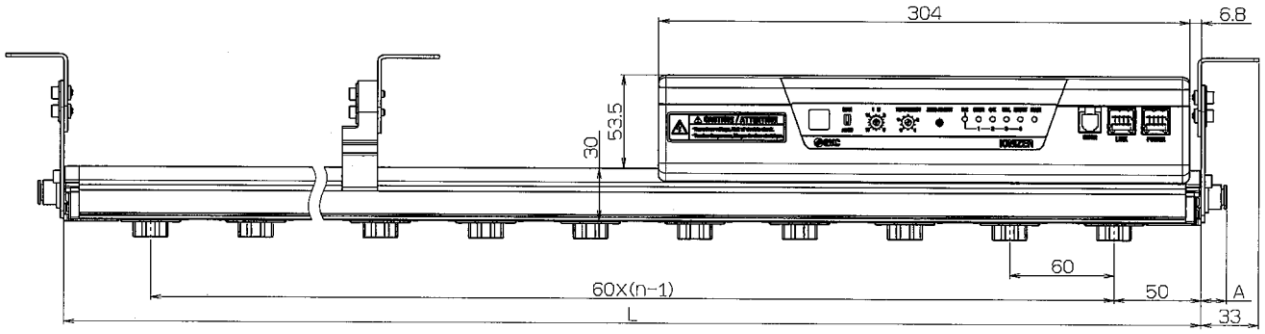
A

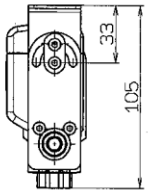
Symbol for fitting	A (mm)
06	13
08	15
10	22

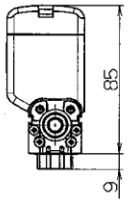
n (No. of cartridge), L

Model	Symbol for bar length	n	L
IZS41 IZS42	340	5	340
	400	6	400
	460	7	460
	580	9	580
	640	10	640
	820	13	820
	1120	18	1120
	1300	21	1300
	1600	26	1600
	1900	31	1900
	2320	38	2320
	2500	41	2500

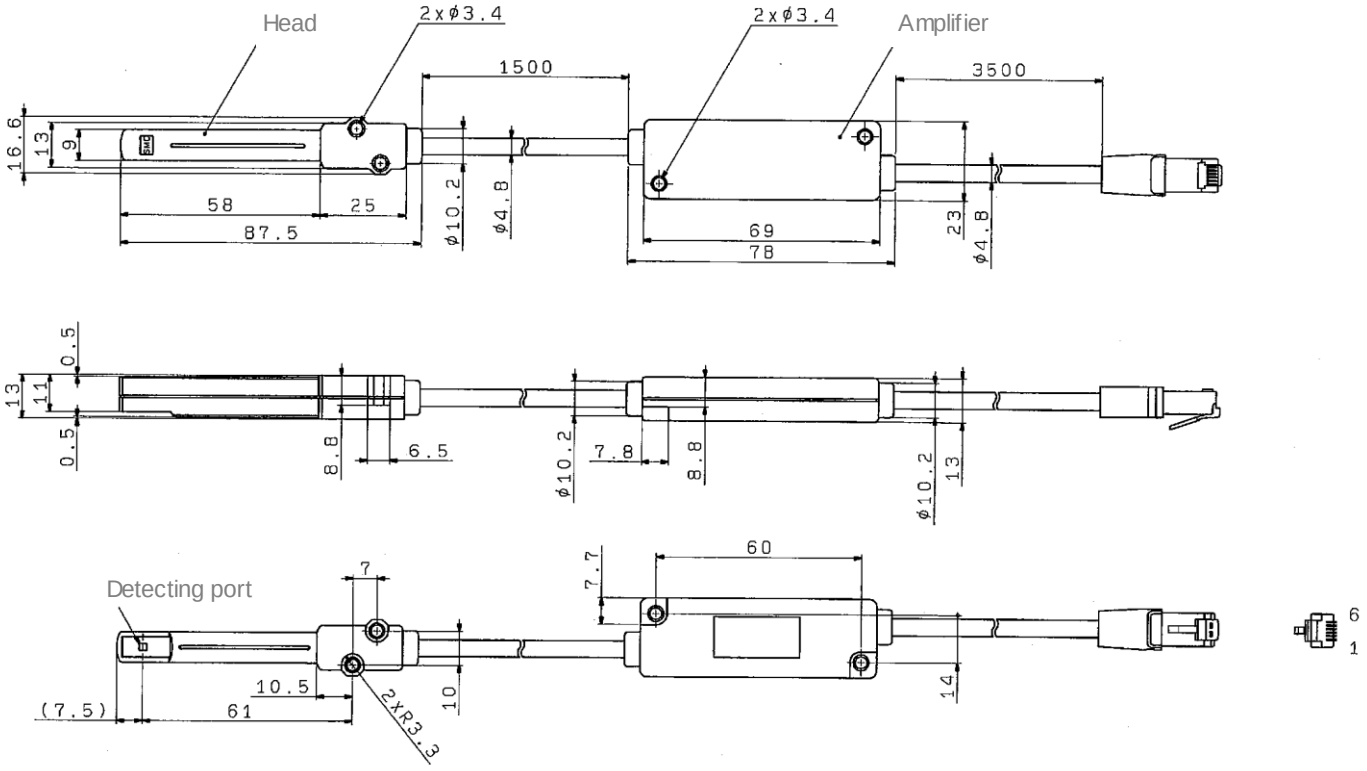




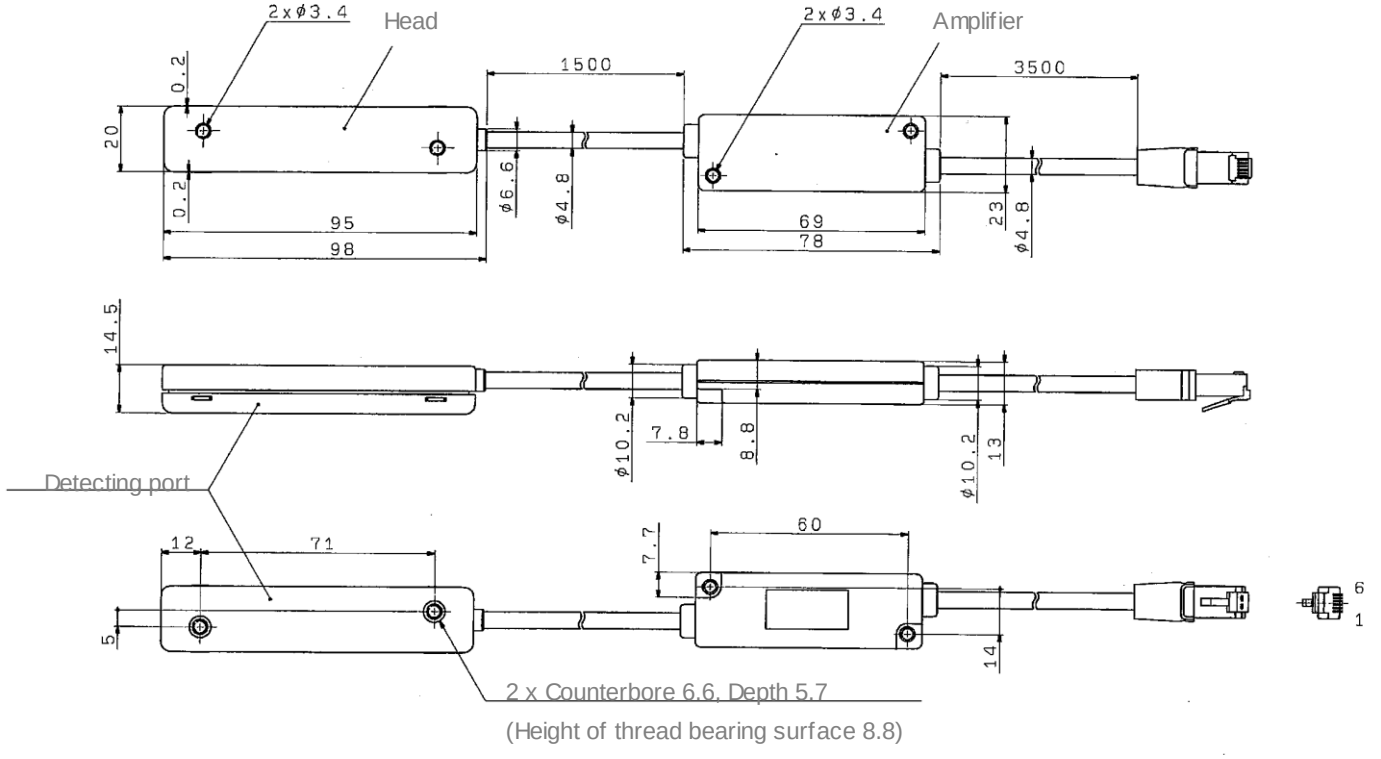




Feedback sensor/ IZS31-DF



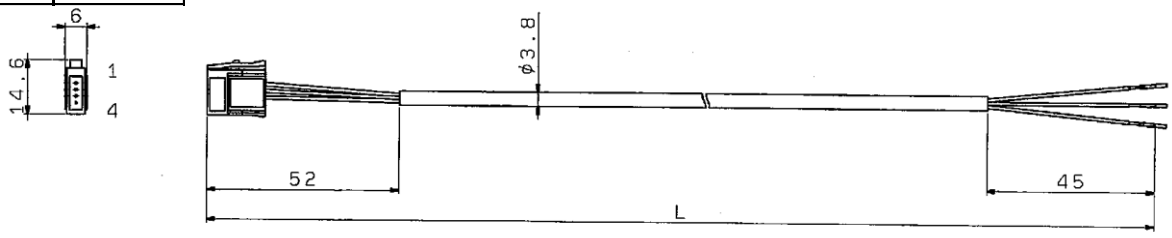
Auto balance sensor (high accuracy type)/ IZS31-DG



Power supply cable

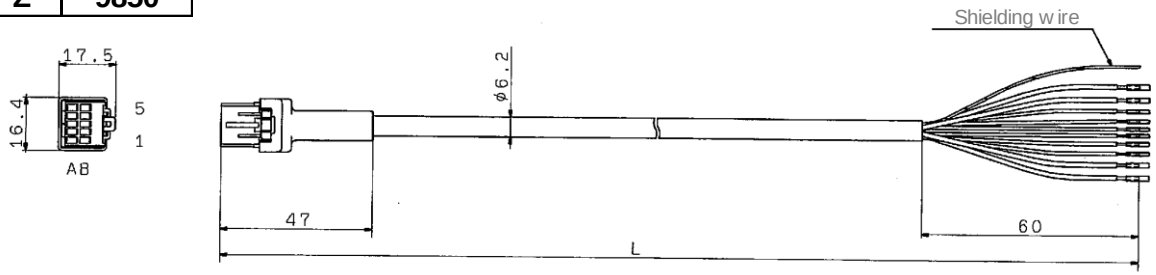
IZS40-CP

Model	L(mm)
IZS40-CP	3000
IZS40-CPZ	9850



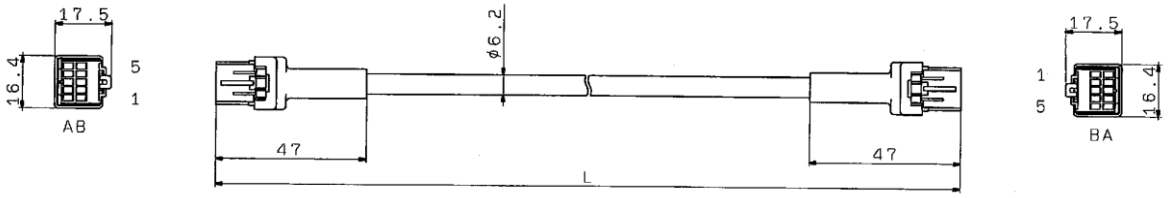
IZS41-CP

Model	L(mm)
IZS41-CP	3000
IZS41-CPZ	9850



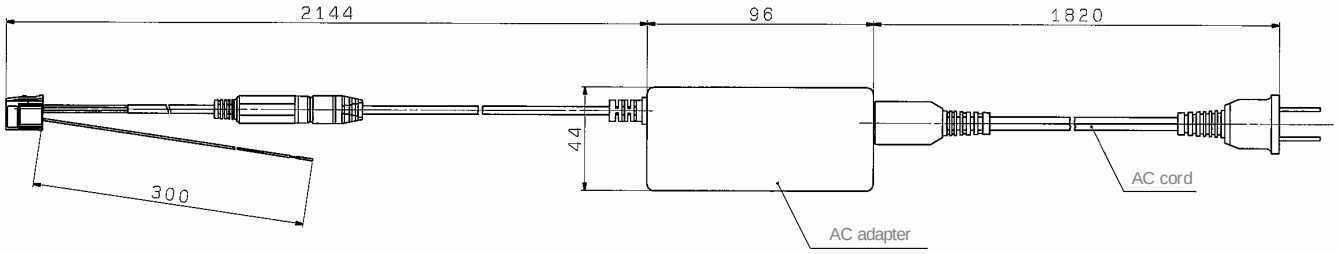
Transition wiri

Model	L(mm)
IZS41-CF02	2000
IZS41-CF05	5000
IZS41-CF08	8000

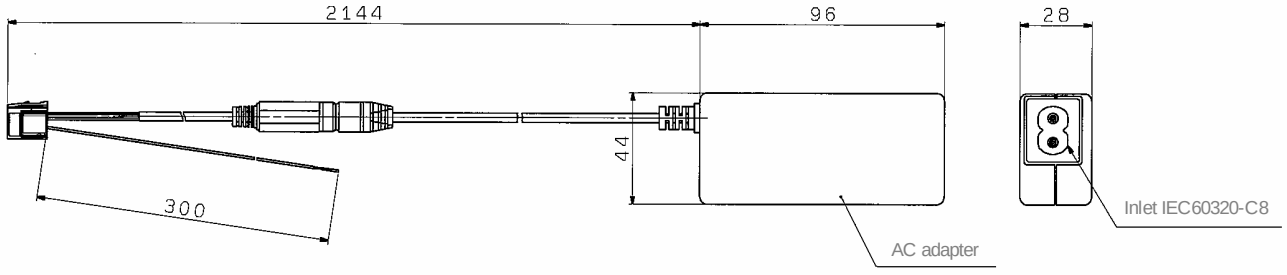


AC adapter

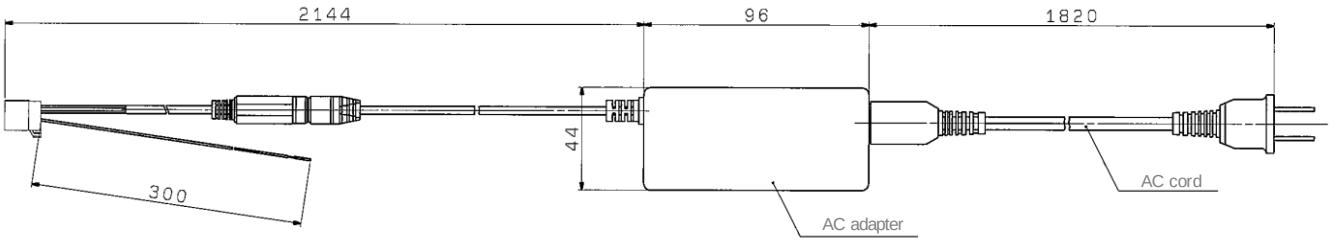
IZF10-CG1 (With AC cord)



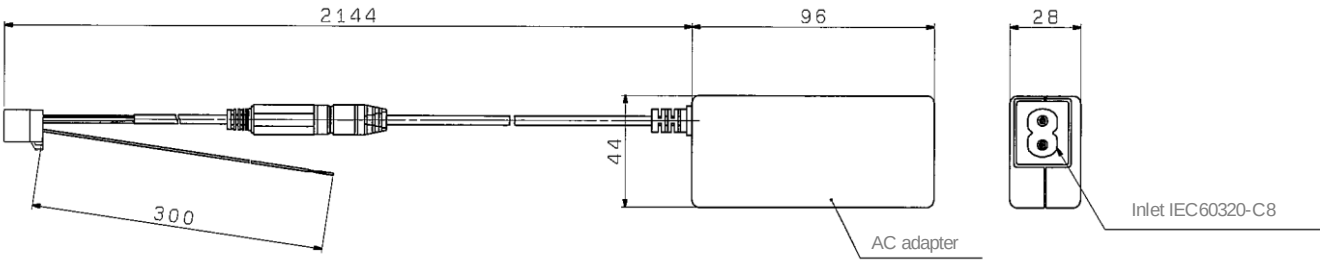
IZF10-CG2 (Without AC cord)



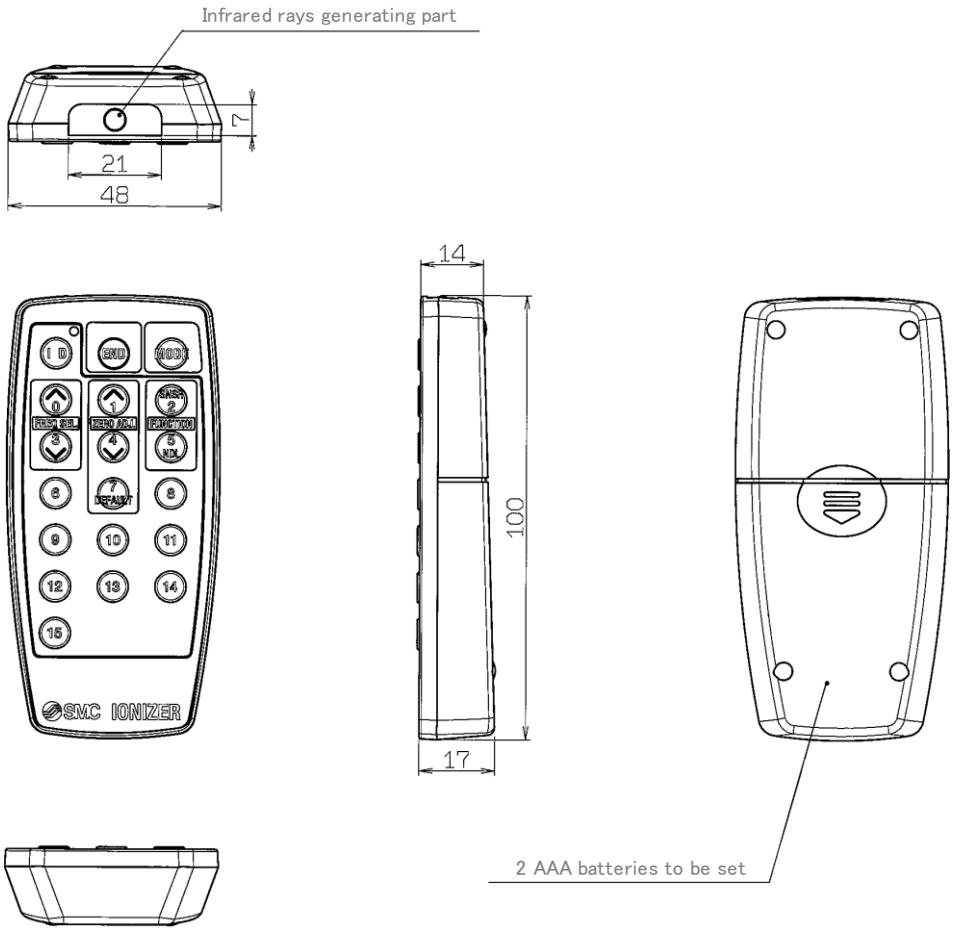
IZS41-CG1 (With AC cord)



IZS41-CG2 (Without AC cord)



Remote controller/ IZS41-RC



8. Specifications

Ionizer

Model		IZS40	IZS41-□□(NPN)	IZS41-□□P(PNP)	IZS42-□□(NPN)	IZS42-□□P(PNP)
Ion generating type		Corona discharging type				
Voltage supply type		AC、DC	AC, Sensing AC, DC		Dual AC	
Applied voltage		+/- 7,000V			+/- 6,000V	
Ion balance *1		+/- 30V				
Air purge	Fluid	Air (Clean and dry)				
	Operating pressure	0.5 MPa or less				
	Proof pressure	0.7 MPa				
	Tube O.D.	φ6 , φ8 , φ10				
Current consumption		330mA or less	440mA or less (For sensing AC, automatic operation and manual operation modes, 480 mA or less)		700mA or less (For automatic operation and manual operation modes, 740mA or less)	
Power supply voltage		24 VDC +/- 10% (100 to 240 VAC: Optional AC adapter)				
Power supply voltage in a transition wiring		—	24 VDC to 26.4 VDC			
Input signal	Ion discharge stop signal	—	Connect with GND Voltage range: 5 VDC or less Current consumption: 5mA or less	Connect with +24V Voltage range: 19 VDC to supply voltage Current consumption: 5mA or less	Connect with GND Voltage range: 5 VDC or less Current consumption: 5mA or less	Connect with +24V Voltage range: 19 VDC to supply voltage Current consumption: 5mA or less
	Electrode contamination detection signal					
Output signal	Maintenance signal	—	Maximum load current: 100mA Residual voltage: 1V or less (Load current 100mA) Maximum applied voltage: 26.4 VDC	Maximum load current: 100mA Residual voltage 1V or less (Load current 100mA)	Maximum load current: 100mA Residual voltage: 1V or less (Load current 100mA) Maximum applied voltage: 26.4 VDC	Maximum load current: 100mA Residual voltage 1V or less (Load current 100mA)
	Error signal					
Function		Incorrect high voltage ion discharge detection (Ion discharge stops during detection)	Ion balance control with the built-in sensor, electrode contamination detection, incorrect high voltage ion discharge detection (stops discharge during detection), ion discharge stop input, transition wiring, remote controller (option), external sensor connection			
Effective de-ionizing distance		50 to 2000mm	50 to 2000mm (Sensing AC mode: 200 to 2000mm, Manual operation/Automatic operation modes: 100 to 2000mm)		50 to 2000mm (Manual operation/Automatic operation modes: 100 to 2000mm)	
Ambient/Fluid temperature		0 to 40 °C				
Ambient humidity		35 to 80% Rh (no condensation)				
Material		Ionizer cover: ABS, Electrode cartridge: PBT, Electrode: Tungsten, Single crystal silicon				
Shock resistance		100m/s ^{2}				
Standard/Directive		CE (EMC directive: 2004/108/EC)				

*1: With air purge at a distance of 300mm between the workpiece and ionizer.

Number of cartridges, Weight

Symbol for bar length		340	400	460	580	640	820	1120	1300	1600	1900	2320	2500
No. of cartridge		5	6	7	9	10	13	18	21	26	31	38	41
Weight (g)	IZS40	590	640	690	790	830	980	1220	1360	1600	1840	2170	2320
	IZS41	740	790	840	940	980	1130	1370	1510	1750	1990	2320	2470
	IZS42	860	910	960	1060	1100	1250	1490	1630	1870	2110	2440	2590

External sensor

External sensor model	IZS31-DF (Feedback sensor)	IZS31-DG (Auto balance sensor [high accuracy type])
Ambient temperature	0 to 50 °C	
Ambient humidity	35 to 85% Rh (no condensation)	
Case material	ABS	ABS, Stainless steel
Shock resistance	100 m/s^2	
Weight	200g (including cable weight)	220g (including cable weight)
Installation distance	10 to 50 mm (Recommended)	-
Applicable standards	CE, UL, CSA	

AC adapter

Model	IZF10-CG∗, IZS41-CG∗
Input voltage	AC100 to 240V, 50/60Hz
Output voltage	24VDC +/-5%
Output current	1A
Ambient temperature	0 to 40 °C
Ambient humidity	35 to 65% Rh (no condensation)
Weight	220g

Remote controller

Model	IZS41-RC
Type	Infrared ray type
Transmission capacity	5m (Varies depending on the operating conditions and environment)
Power supply	2 AA A sized batteries
Ambient temperature	0 to 45 °C
Ambient humidity	35 to 80% Rh (no condensation)
Weight	33g (Batteries not included)

Fault	Model			Details	Possible Cause	Investigation method and possible cause	Countermeasures
	IZS40	IZS41	IZS42				
Product does not operate	O	O	O	No power ("MAIN" LED is OFF.)	Power supply incorrectly wired	Check the power supply wiring. Check whether both brown wires are connected to 24 VDC and both blue wires are connected to ground.	Ensure all connections are in accordance with [2. Wiring]
	O	O	O	"MAIN" LED only is flashing	Power supply voltage is out of range	Check the power supply input is within the range of 24 VDC +/-10%.	Ensure the power supply is in the range 24 VDC +/- 10%.
	O	O	O	"MAIN", "ION / HV" (red), "NDL", "RC", "SNSR" (red) and "OK" LEDs are all flashing	CPU malfunction caused by noise	1) Check if there is any high current equipment installed near the ionizer 2) Check if the power supply cable is routed together with any high power cables	1) If any high current equipment is nearby, either move it away or consider an alternative location for the ionizer. 2) Route the ionizer wiring separately to high power cables. 3) Install a filter to the ionizer power supply.
	O	O	O	"ION / HV" LED is red	Abnormal high voltage discharge	1) Check the electrode for contamination. 2) Check whether there is arcing between the ionizer and workpiece to be neutralized. 3) Check whether the ionizer is used in an environment subject to condensation or moisture.	1) Clean the electrode if there is any contamination present. *1 2) If there is arcing between the workpiece to be neutralized and the ionizer, increase the distance between them until arcing no longer occurs. 3) The ionizer must not be used in environments subject to condensation or moisture.
	-	O	O	"SNSR" LED is red	1) Sensor connection problem 2) Failed sensor	1) Check the sensor cable for damage. 2) Check if a whining noise can be heard from the detection port of the sensor.	1) If the sensor cable is damaged it should be repaired or replaced. 2) If there is no sound from the sensor, it is likely to have failed and should be replaced.
No output signal	-	O	O	No output signal	Output circuit wired incorrectly	Check the output specifications (NPN/PNP) and wiring of yellow and purple wires	Ensure all connections are in accordance with [2. Wiring]
	-	O	O	"ION / HV" LED is flashing green	Output circuit wired incorrectly (over current)	Check the output specifications (NPN/PNP) and wiring of yellow and purple wires	Ensure all connections are in accordance with [2. Wiring]
Unable to input a signal	-	O	O	Unable to input a signal	Input circuit wired incorrectly	Check the input specifications (NPN/PNP) and wiring of the light green and grey wires	Ensure all connections are in accordance with [2. Wiring]
No/poor neutralizing performance	O	O	O	Poor ion balance	Ion balance not adjusted correctly	Check the ion balance with an instrument such as a charged plate monitor.	Adjust the ion balance with the trimmer labelled "ZERO ADJUST" on the front panel.
	O	O	O	Electrode is contaminated.	Reduction of ion generation due to dust or contamination on the electrode	Check the electrode for contamination	Clean the electrode if there is any contamination present. * 1
	O	O	O	Electrode is bent, chipped or worn	Reduction of ion generation due to bending, chipping or wear of the electrode	Examine the electrode tip with a magnifier	Replace the electrode cartridge.
	-	O	O	"NDL" LED is ON (when electrode contamination detection signal is input)	1) Dust or other contamination on the electrode 2) Electrode is worn or damaged.	1) Check the electrode for contamination. 2) Examine the electrode tip with a magnifier.	1) Clean the electrode* 1 2) Replace the electrode cartridge.
		O	O	"NDL" LED is ON (during manual or auto operation)	1) Dust or other contamination on the electrode 2) Electrode is worn or damaged. 3) Generated ions are not reaching the sensor	1), 2) Examine the electrode tip with a magnifier. 3) Ions can be absorbed by an enclosure or walls surrounding or close to the ionizer. An external airflow could interfere with the flow of ionized air from the ionizer.	1) Clean the electrode* 1 2) Replace the electrode cartridge. 3) If there is an object that absorbs ions near the ionizer or sensor, move it away. If external air flow is having an effect, shut off the air flow, so that ions can reach the sensor.
	-	O	O	"ION / HV" LED is OFF.	Discharge stop signal is being input.	Check whether the discharge stop signal (light green wire) is being input.	When performing static electricity neutralization, do not input the discharge stop signal.
	O	O	O	Ionized air is not reaching the workpiece to be neutralized	1) Compressed air flow insufficient 2) Interference with air flow	1) Check that the supply pressure and flow rate are sufficient. 2) Check if an external air flow could interfere with the flow of ionized air from the ionizer.	1) If flow rate is insufficient, increase the supply pressure or alter the piping circuit to improve airflow. (Refer to [2. Installation]) 2) If an external airflow is having an effect, consider shutting off the air flow or otherwise changing the installation so that ionized air is not interfered with.
	O	O	O	There are obstacles/obstructions between the workpiece to be neutralized and the ionizer.	Ionized air blocked or absorbed by obstacles	Check that there are no obstacles which could absorb ions on the path used for supplying ionized air to the workpiece to be neutralized.	Objects between the ionizer and workpiece to be neutralized will block off or absorb the ionized air. Ensure there are no objects between, or near to, the ionizer and workpiece to be neutralized.
	O	O	O	Two or more ionizers are installed close to each other.	Interference with ionized air	Check if ionized air from nearby ionizers is interfering with that of the main ionizer, by starting and stopping the nearby ionizers and seeing if the performance of the main ionizer is affected.	If ionizers are installed close together, they may interfere with each other, and cause a decrease in performance. Refer to [Safety instruction, installation].
	O	O	O	No F.G. connection	Incorrect voltage reference	Check whether F.G. (green wire) is connected.	The ionizer neutralizes static electricity relative to ground; ensure the green wire always has a ground connection of less than 100Ω.

*1. Clean the electrodes with the cleaning kit or cotton wool soaked in alcohol approximately every two months. The required frequency of cleaning will vary depending on the local environment, so should be set in the user's application.

10. Maintenance

Warning

A high voltage generating circuit is mounted onto this product. Verify that the power supply is OFF when performing maintenance. When compressed air is supplied to the product, shutoff the supply before performing any maintenance operation. Never disassemble or modify the product, as this can cause loss of product functionality, and a risk of electric shock and earth leakage. Do not touch the end of the electrodes. Electrodes have a sharp end and touching them directly with your fingers may cause injury.

Only people who have sufficient knowledge and experience are allowed to clean the electrodes.

If the ionizer is used for an extended period of time, contamination such as dust, can stick to the electrodes, reducing the static electricity elimination performance.

IZS41 and IZS42 have an electrode dirt detecting function. When dirt is detected, clean the electrodes. In cases where the electrode contamination detecting function is not used on the IZS41 or IZS42 or when using the IZS40 which does not have a contamination detecting function, periodically test the static neutralization performance of the ionizer. It is highly recommended that a periodic maintenance cycle be established. This will prevent contamination buildup on the electrodes which may vary depending on the installation environment, supply pressure, etc.

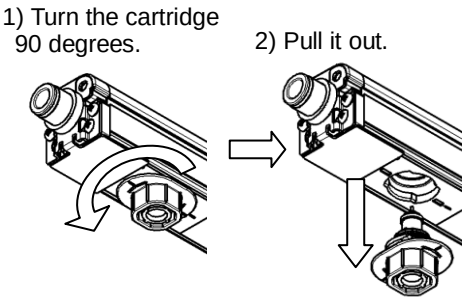
If the maintenance signal is output upon completion of cleaning the electrode, it may not have been cleaned sufficiently or it may be worn or damaged. If wear or damage of the electrode is detected, replace the electrode cartridge with a new one. (If the electrode is worn out or damaged, the static electricity elimination performance will decrease.)

Cleaning procedure of the electrode

It is highly recommended that the electrode cleaning kit (IZS30-M2) is used to clean the electrode needles.

a. Before cleaning the electrodes, shutoff the power and air supply.

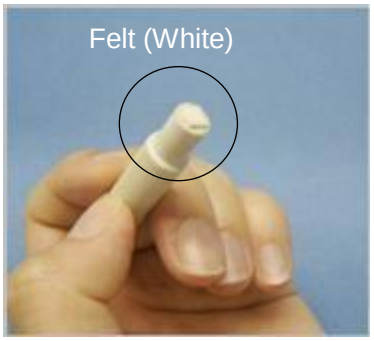
b. The electrodes may be cleaned with the electrode cartridges mounted to the bar or with the cartridges removed from the bar.
Refer to "Removal procedure of electrode cartridge" shown below for instructions on how to remove the cartridges.

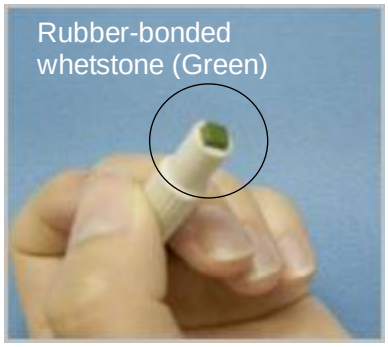


Removal procedure of electrode cartridge

c. The electrode cleaning kit (IZS30-M2) has felt at one end of the tool and rubber-bonded whetstone at the other end of the tool.

Electrode cleaning kit (IZS30-M2)



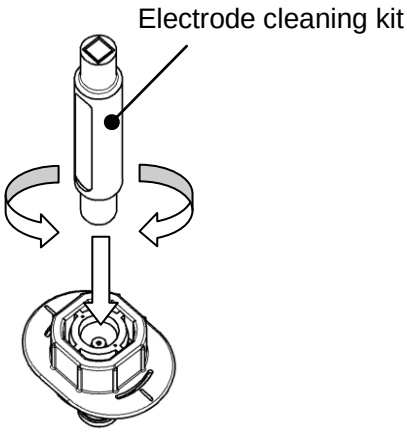


Saturate the felt end of the electrode cleaning tool with alcohol and insert it into the back of the electrode cartridge. Turn the tool for several rotations to thoroughly remove dirt.

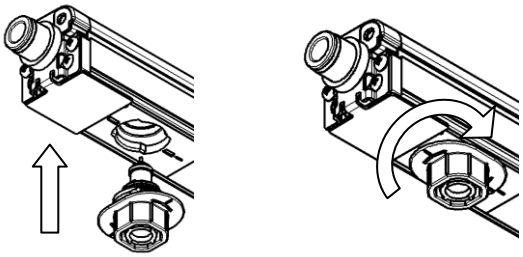
If it is not possible to thoroughly remove the dirt using the felt end of the cleaning tool, the rubber-bonded whetstone should be used in the same procedure as described for that of the felt end.

If you do not have a cleaning kit, an alcohol saturated cotton ball can be used for cleaning the electrodes. , Use caution to prevent damage to the electrode needles. (It is highly recommended to use the electrode cleaning kit.)

The alcohol used should be reagent ethanol class 1 99.5vol% or more.

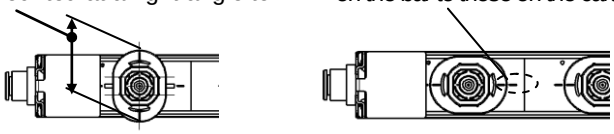


d. When the electrode cartridges are removed for cleaning, remount them to the ionizer according to the "Mounting procedure of electrode cartridge" shown below. Make sure that the cartridges are securely mounted. If not, the cartridges may become dislodged when compressed air is supplied to the ionizer.



1) Insert the cartridge into the bar so that the longer side of the cartridge is mounted at a right angle to the bar.

2) Rotate the cartridge 90 degrees to match the markings on the bar to those on the cartridge and secure.



Mounting procedure of electrode cartridge

e. Confirm that the static neutralization performance is maintained after cleaning and remounting of the cartridges are completed.

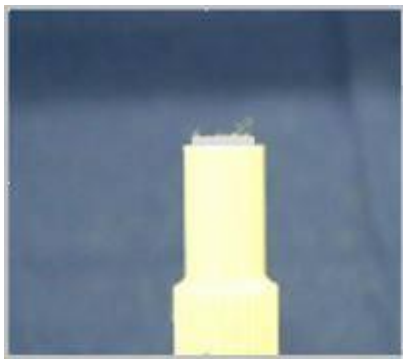
Replacement of the felt or rubber-bonded whetstone tips of the cleaning kit

The felt or rubber-bonded whetstone tips should be replaced when it becomes dirty, as it will not sufficiently clean the electrode needles.

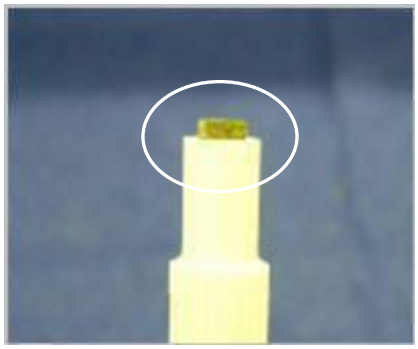
a. Remove the felt or the rubber-bonded whetstone tip at the end of the cleaning kit.

Removing the felt

b. Insert a new felt or rubber-bonded whetstone tip into the cleaning kit using the reverse procedure as the removal. The felt and the rubber-bonded whetstone tips are rectangular, and the inserting orientation is specified. The end of the rubber-bonded whetstone tip will stick out of the cleaning kit end for 1mm. Do not push it in too much.



Cleaning kit with felt



Cleaning kit with rubber-bonded whetstone

Part number for spare felt/ rubber-bonded whetstone tips

Part	Part number	Qty.
Spare felt	IZS30-A0201	10pcs
Spare rubber-bonded whetstone	IZS30-A0202	1pcs

Revision history
Revision A (Dec 4, 2012) Revision to "Recommended piping bore size" table (p9) Revision to "One-touch fitting selection (Non-standard bar length)" table (p14) Revision to the note (p27 to p31) Addition of "9. Troubleshooting" (p62) Revision B (May 28, 2013) Revision to the note (p8) Revision to the electrode cleaning kit (p13) Removal of the description about cleaning from (p39), and addition of "10. Maintenance" (p63)

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