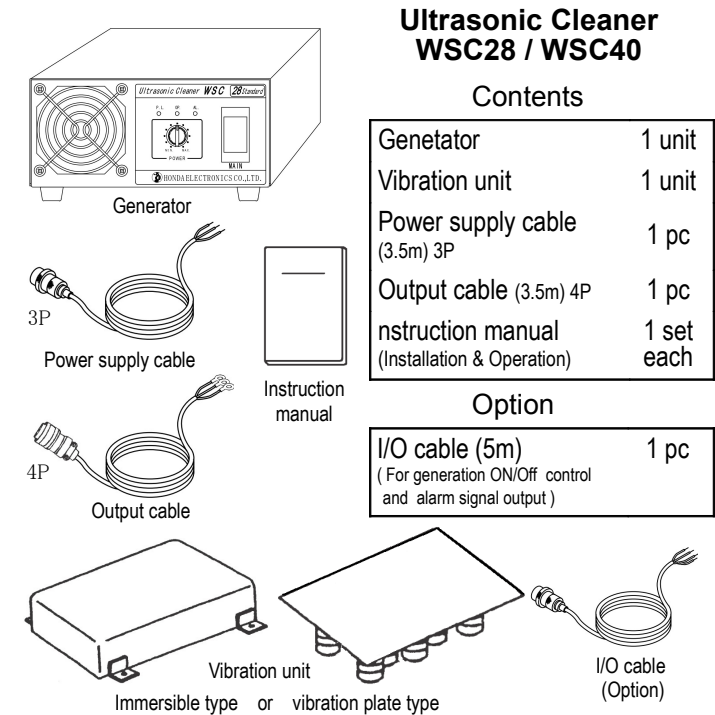


Instruction manual
(Operation)



1. Introduction

- 1-1 We would like to advise you to carefully read these conditions before using our products
>Regarding the installation of the equipment, [Instruction manual (Installation)] separately attached shall be referred.
>On maintenance works, precautions described on [Instruction manual (Installation)] separately attached shall be properly followed for your safety.
>For your safe operation, inspection shall be properly engaged before operation starts.
>After-mentioned [7. Precautions] shall be carefully read and fully understood before operation starts.
>The generator shall be started to operate after confirmation of supplying of cleaning liquid into the cleaning tank.

1-2 Product features

- >Lower power consumption (one third of conventional model)
>Compact size (one third of conventional model - the volume size and weight)
>Unevenness of cleaning inside cleaning tank is very few.

2. Names and external dimensions of parts of the generator

- >After-mentioned [8. External view] shall be referred.

3. Inspection before operation starts

3-1 Confirmation of connection

- >Connection is properly completed and being kept dry.
>Protective earth conductor is properly connected.

3-2 Inspection of cables

- >Power supply cable and output cable shall have no damage, no twist, no acute bend and no wet.

3-3 Switches on rear panel of the generator

- >Switches shall be properly set up according to operation and system to be applied.

3-4 Kind and amount of cleaning liquid

- >The applicable cleaning liquid is supplied in the cleaning tank at proper amount.
(The clearance between the surface of the vibration unit and the liquid level shall be 100mm and over.)

3-5 Position of cleaning objects

- >Clearance between the surface of the vibration unit and cleaning objects shall be at least 50mm.

4. Operating Instructions

4-1 Cleaning works (manual operation)

- >Supplying cleaning liquids into the cleaning tank where the vibration unit has been already installed.
>Dipping the cleaning object into the cleaning liquid inside tank.
>Turning ON the power supply switch.
(In case of using external control function, the power supply of the external control unit shall be turned ON.)

- >Cleaning work shall start.
>Turning OFF the power supply switch in order to stop the cleaning work. (In case of using external control function, the power supply of the external control unit shall be turned OFF.)

4-2 Adjustment of power output

- >Power output is adjustable (variable range is around 0 ~ 100%) with adjustable knob on front panel of the generator.

4-3 Generation ON/OFF control

- Controlling of operation with the external control function (by [CONTROL] switches on rear panel) is available.
>In case of switching to [LOCAL] on rear panel.
The power supply switch shall be turned ON to start operation and OFF to stop operation.
>In case of switching to [REMOTE] on rear panel.
After connection of I/O cables and interface connectors on rear panel of the generator, I/O cable's Black(#1) and White(#2) shall be short-circuited to start operation and be opened to stop operation.

- 4-4 In case that alarm lamp (AL. : red) lights up,
>After-mentioned [9. Trouble shooting] should be referred.
>In order to cancel the alarm lamp's lighting up, the power supply shall be reset (turning OFF and ON).

4-5 Alarm signal output.

- >I/O cable's Black(#1) and Red(#3) shall be short-circuited to output alarm signal, during alarm (AL.) lamp's lighting up.
>This output function is open collector output (Black : emitter, Red : collector).
>This output function can be controlled by alarm mode select switch.

Alarm mode select switch	Normal	Abnormal	Power supply OFF
REV	Open(H)	Short-circuit(L)	Open(H)
STD	Short-circuit(L)	Open(H)	Open(H)

* [Instruction manual (Installation)] should be referred about more details.

5. Cleaning liquid

5-1 Selection of cleaning liquid

- >Direct use of aquatic or non-combustible organic solvent liquids within pH6 ~ pH10 in the cleaning tank is available.
>Direct use of liquids which do not fall under the above-mentioned in the cleaning tank shall have a possibility to be a cause of damages against the vibration unit or taking place of accidents. Such kind of liquid must be applied only by users' own responsibility.
>Acidic liquid is available to use only in case that the liquid is put inside an inner glass container under 2-layers tank system. Even though of it, coming of droplets of the acidic liquid into the outer layer tank's cleaning liquid must be avoided, otherwise it shall be a cause of damages against the vibration unit.
>All liquids which could catch fire or explode such as thinner and benzene must not be used as cleaning liquid.

5-2 Replacement of cleaning liquid

- >The cleaning effect of cleaning liquids gradually decreases as time goes by. When the cleaning liquid became less effective, it shall be replaced with new one.
>When discharging hot liquid and supplying cooling cleaning liquid to the cleaning tank, the tank shall be left empty for a while for cooling down before re-supplying. After the temperature of the tank became same level to the ambient temperature, the cool cleaning liquid can be supplied into the tank.

6. Specifications

6-1 Vibration unit specifications

Model	WSC28		WSC40	
Power type	Standard	High-Power	Standard	High-Power
Q'ty of BLT	7 pcs	14 pcs	10 pcs	20 pcs
Generation mode	Self-generation. Modulation is available (FM+AM).			
Peak power output (referential value)	600W	1200W	600W	1200W
Averaged	200W	400W	200W	400W
Variable power output	Around 0 ~ 100% continuously-variable			
Nominal generation frequency	28kHz		40kHz	
Power input	AC200 ~ 230 +/-10%, 1-Phase, 50/60Hz			
	300VA	600VA	300VA	600VA
Remote control function	Generation ON/OFF control (contact input)			
Output function	Lamp lighting on abnormal operation. Alarm signal output (open collector output)			
Usage environment	Temperature : 5 ~ 40oC, Humidity : 5 ~ 80% (no condensation allowed).			
External dimensions (mm)	210(W) x 250(D) x 107(H) (D : excluding projections, H : including rubber feet)			
Weight	Around 3.6kg			
Accessories	Manual (Installation & Operation), Power supply cable, Output cable (but only in case of the vibration unit without output cable).			
Option	I/O cable (for interface connector connection)			

6-2 Vibration unit specifications (general)

Generator model	WSC28		WSC40	
Nominal generation frequency	28kHz		40kHz	
Power type	Standard	High-Power	Standard	High-Power
Q'ty of BLT	7 pcs	14 pcs	10 pcs	20 pcs
Max. allowed input power	600W	1200W	600W	1200W

6-3 Standard dimensions of vibration units

Type		Vibration plate type				Immersible type			
Power type		Standard		High-Power		Standard		High-Power	
Nominal generation frequency		28 kHz	40 kHz	28 kHz	40 kHz	28 kHz	40 kHz	28 kHz	40 kHz
External dimensions (mm) (excluding projections)	(W)×(D)	390×240		460×340		350×200		420×300	
	(H)	(71)	(57)	(71)	(57)	100	75	100	75
Thickness of the surface of generation plate		2.5mm							
Material		Generation plate : SUS304 Packing : EPDM(3t)				Casing : SUS304			
Vibration unit cable		1m				2.5m (including 2m braded hose)			
Max. liquid temperature		100 deg.C				80 deg.C			
Weight(kg)		5.1	4.2	9.3	7.8	8.3	7.2	13.9	12.0

*() are the height dimensions including necessary clearance.

6-4 Power supply cable

- Electrical cable : VCTF 2.0mm2 x 3cores, 3.5m
Terminal#1 : cable colour = Green, protective earth terminal.
Terminal#2 : cable colour = Black, power supply terminal.
Terminal#3 : cable colour = White, power supply terminal.

6--5 Output cable

- Electrical cable : VCT 2.0mm2 x 2 shield cores, 3.5m.
Terminal A : connected to shield, GND.
Terminal B : cable colour = Black, vibration unit [-].
Terminal C : cable colour = Red, vibration unit [+].
Terminal D : no connection.

6-6 I/O cable (option)

- (For interface connector connection)
Electrical cable : MVVS 0.3mm2 x 4 shield cores, 5m.
Terminal#1 : cable colour = Black, common GND (emitter).
Terminal#2 : cable colour = White, operation ON/OFF control.
Terminal#3 : cable colour = Red, alarm signal output (collector).
Terminal#4 : cable colour = Green, no function (collector).

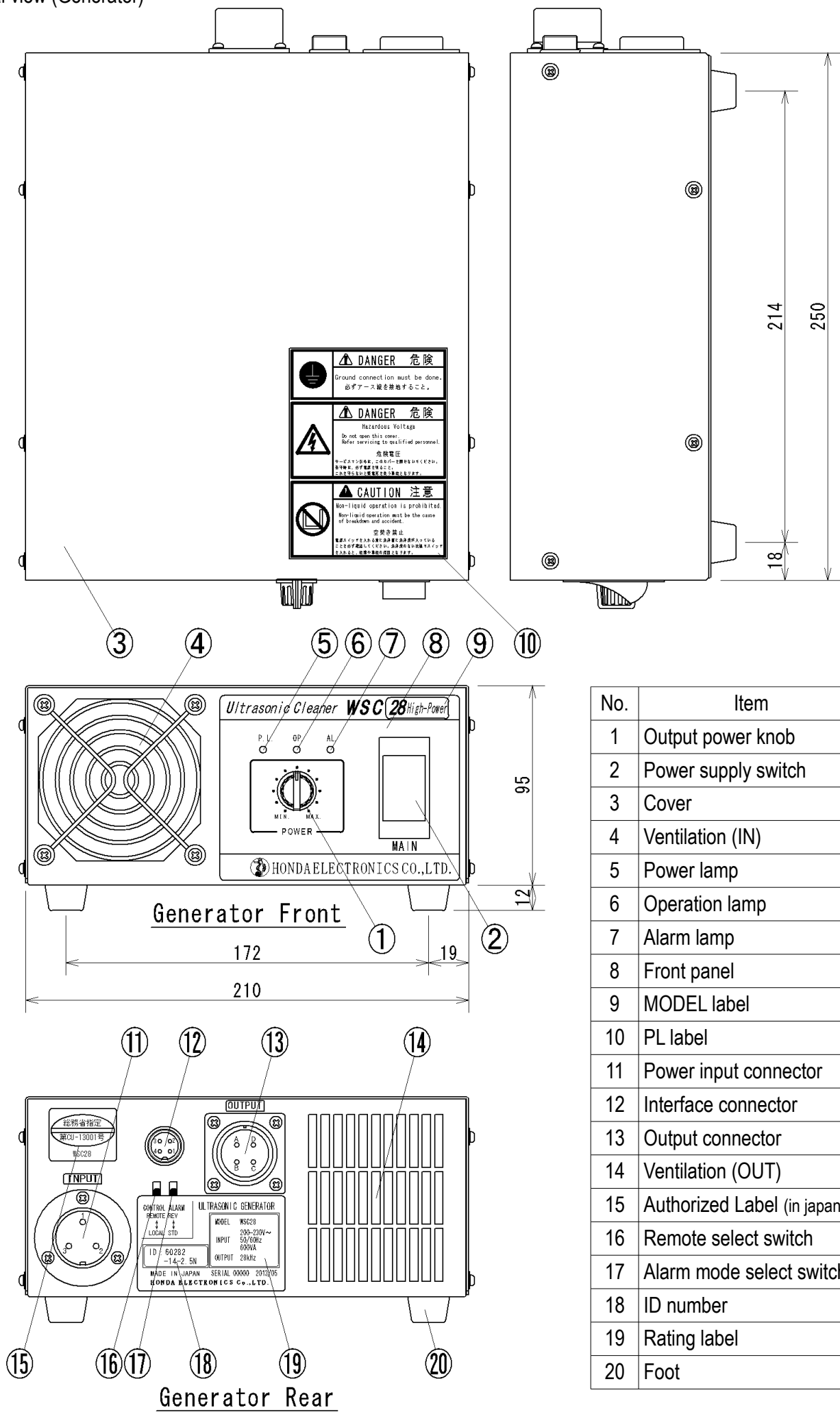
7. Precautions

	When the warning messages are not observed, there could be serious injury or even death.
<ul style="list-style-type: none">- Persons with a pacemaker shall not use the equipment.- Power supply switch or power supply plug must not be handled with wet hands.- All liquids which could catch fire or explode such as thinner and benzene must not be used as cleaning liquid.- The equipment must be used at a safe place without flammable gas or explosive gas.	

	When the warning messages are not observed, there is a possibility for serious injury or even death.
<ul style="list-style-type: none">- Cover or screws of generator must not be removed by anyone but only by our designated service staffs. Touching internal sections of the generator is very dangerous and shall be a cause of trouble.- Generator and connection part of electrical cable must be placed where has no wet or splash.- Cables must be kept dry during operation, otherwise it shall be cause of burning out.- Must avoid cables of vibration unit and power supply from damages. If damaged, it shall be a replaced with new one.- The equipment must be kept away from acidic or corrosive liquid.- The cleaning objects exceeding 10kg in weight should be lifted by 2 and more persons or by a hoist. Much attention should be paid not to drop the cleaning objects and not to suffer from lower backache..- Must have adequate understanding about characteristics and safety cautionary items of the cleaning liquid and waste liquid. Must be informed about emergency measures when making contact with the liquid or when accidentally swallowing the liquid.- During operation, hands or fingers must not be put directly into the cleaning liquid because there is a possibility for hurting joints. If hands or fingers are needed to put into the cleaning liquid in order to perform works, thick rubber gloves shall be worn with your hand.- When the following phenomena occur during power ON or operation, immediately must cut off the power supply and contact us or our agent.<ul style="list-style-type: none">~ Abnormal noise, heat or smoke occur.~ AL. lamp (alarm, red colour) lights up.~ P.L. lamp (power) does not light up.~ No ultrasonic generation sound during operation.~ The power switch quickly turns off by itself.- When the following cases happened, immediately must cut off the power supply and contact us or our agent.<ul style="list-style-type: none">~ Water or liquid is on the generator.~ Electricity can be felt, on touching the equipment.	

	When the warning messages are not observed, there is a possibility for breakdown of the equipment itself or abnormal performance.
<ul style="list-style-type: none">- Vent of generator shall be cleaned up periodically. Particles and dust adhering to vent shall interrupt ventilation, which shall be a cause of trouble due to temperature rise inside generator.- Generation must not start with empty cleaning tank, otherwise it shall be a cause of breakdown of the vibration unit.- Cleaning objects shall be placed evenly above the vibration unit inside cleaning tank during operation. Placing cleaning objects unevenly shall be a cause of shortened service life time or breakdown of the vibration unit.- Must take care so that the cleaning objects shall not touch the surface of the vibration unit directly.- Foreign matters covering the surface of the vibration unit shall be cleaned up.	

8. External view (Generator)



No.	Item
1	Output power knob
2	Power supply switch
3	Cover
4	Ventilation (IN)
5	Power lamp
6	Operation lamp
7	Alarm lamp
8	Front panel
9	MODEL label
10	PL label
11	Power input connector
12	Interface connector
13	Output connector
14	Ventilation (OUT)
15	Authorized Label (in japan)
16	Remote select switch
17	Alarm mode select switch
18	ID number
19	Rating label
20	Foot

9. Trouble shooting

Troubles	Confirmation items	Countermeasures
Operation does not start after turning ON.	If power is supplied or not.	To turn ON the power supply.
	If the connection of generator cable is loose or not.	To connect generator cables correctly.
	If the remote select switch is switched to REMOTE, and between 1 & 2 of interface connector is opened, or not.	To switch the remote select switch to LOCAL, or to short-circuit between 1 & 2 of interface connector.
Generation ON/OFF control is not workable.	If the remote select switch is switched to LOCAL or not.	To switch the remote select switch to REMOTE.
Electricity can be felt, on touching the equipment.	If earthing is correctly connected or not.	To connect earthing correctly.
	If water or liquid is on the generator or not.	To wipe the water or the liquid away, and to require inspection of us or our agent.
	If the generator is placed at humid location or not.	To move the generator to low-humidity location.
Power output is weak.	If the power output knob is set to MIN or not.	To adjust the knob to increase the power output.
	If the water level interrupts proper power output or not.	To adjust the water level.
Generator became hot abnormally.	If clearance around vent is enough for ventilation or not, and if particles and dust are not adhering to vent or not.	To turn OFF the operation and make the generator cool down. And, if this trouble could not be solved even after cool down, inspection should be required of us or our agent.
Operation stopped with lighting up of alarm lamp.	If the generator became hot abnormally or not.	
	If the vibration unit is disconnected or not.	To connect the vibration unit correctly.
	If the vibration unit is short-circuited or not.	To inspect if cable connection is correct or not.
Alarm lamp is blinking.	If the cleaning object is too close to the surface of the vibration unit or not. Or, if the liquid level is too low or not.	To re-arrange the position of the cleaning object inside cleaning tank, or to re-adjust the liquid level. And, if this trouble could not be solved even after re-arrangement or re-adjustment, there is a possibility of deterioration of the vibration unit. Inspection should be required of us or our agent.

10. Warranty

10-1 Warranty period
>Warranty period is either 1 year from the B/L (or AWB) date or 2,000 operating hours, whichever comes first.

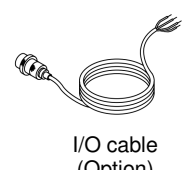
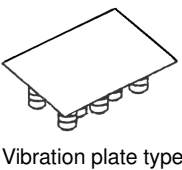
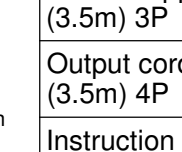
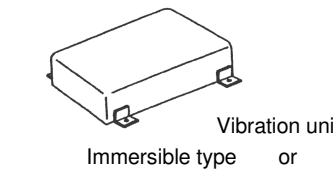
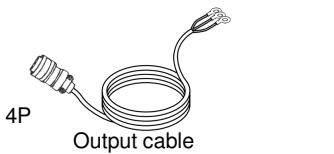
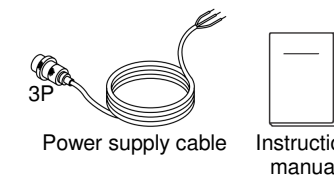
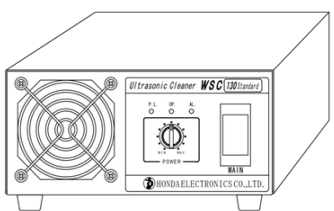
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Instruction manual

(Operation)



Ultrasonic cleaner WSC75 / WSC130 WSC160

Contents

Generator	1 unit
Vibration unit	1 unit
Power supply cord (3.5m) 3P	1 pc
Output cord (3.5m) 4P	1 pc
Instruction manual (Installation & Operation)	1 set each

Option

I/O cable (5m) (For generation ON/OFF control and alarm signal output)	1 pce.
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- >Supplying cleaning liquids into the cleaning tank where the vibration unit has been already installed.
- >Dipping the cleaning object into the cleaning liquid inside tank.
- >Turning ON the power supply switch.
(In case of using external control function, the power supply of the external control unit shall be turned ON.)
- >Cleaning work shall start.
- >Turning OFF the power supply switch in order to stop the cleaning work. (In case of using external control function, the power supply of the external control unit shall be turned OFF.)

4-2 Adjustment of power output

- >Power output is adjustable (variable range is around 0 ~ 100%) with adjustable knob on front panel of the generator.

4-3 Generation ON/OFF control

- Controlling of operation with the external control function (by [CONTROL] switches on rear panel) is available.
- >In case of switching to [LOCAL] on rear panel.
The power supply switch shall be turned ON to start operation and OFF to stop operation.
- >In case of switching to [REMOTE] on rear panel.
After connection of I/O cable and interface connectors on rear panel of the generator, I/O cable's Black(#1) and White(#2) shall be short-circuited to start operation and be opened to stop operation.

4-4 In case that alarm lamp (AL. : red) lights up,

- >After-mentioned [9. Trouble shooting] should be referred.
- >In order to cancel the alarm lamp's lighting up, the power supply shall be reset (turning OFF and ON).

4-5 Alarm signal output.

- >Black(#1) and Red(#3) of I/O cable shall be short-circuited to output alarm signal, during alarm (AL.) lamp's lighting up.
- >Alarm output is done by the open collector output (Black: Emitter, Red: Collector).
- >Alarm output function can be controlled by Alarm mode select switch.

Alarm mode Select switch	Normal	Abnormal	Power supply OFF
REV	Open (H)	Short-circuit (L)	Open (H)
STD	Short-circuit (L)	Open (H)	Open (H)

* [Instruction manual (Installation)] should be referred about more details

5. Cleaning liquid

5-1. Selection of cleaning liquid

- >Direct use of aquatic or non-combustible organic solvent liquids within pH6 ~ 10 in the cleaning tank is available.
- >Direct use of liquids which do not fall under the above-mentioned in the cleaning tank shall have a possibility to be a cause of damages against the vibration unit or taking place of accidents. Such kind of liquid must be applied only by users' own responsibility.
- >Acidic liquid is available to use only in case that the liquid is put inside an inner glass container under 2-layers tank system. Even though of it, coming of droplets of the acidic liquid into the outer layer tank's cleaning liquid must be avoided, otherwise it shall be a cause of damages against the vibration unit.
- >All liquids which could catch fire or explode such as thinner and benzene must not be used as cleaning liquid.

5-2. Replacement of cleaning liquid

- >The cleaning effect of cleaning liquids gradually decreases as time goes by. When the cleaning liquid became less effective, it shall be replaced with new one.
- >When discharging hot liquid and supplying cooling cleaning liquid to the cleaning tank, the tank shall be left empty for a while for cooling down before re-supplying. After the temperature of the tank became same level to the ambient temperature, the cool cleaning liquid can be supplied into the tank.

6. Specifications

6-1. Generator specifications

Model	WSC75	WSC130	WSC160
Nominal generation frequency	75kHz	130kHz	160kHz
Type	Standard		
Q'ty of BLT	18 pcs.		
Generation mode	Self-generation. Modulation is available (FM+AM).		
Peak output power	600W		
Averaged output power	200W		
Variable output power	Around 0 ~ 100% continuously-variable		
Power input	AC200 ~ 230V +/-10%, 1-Phase, 50/60Hz		
	300VA		
Remote control function	Generation ON/OFF control (contact input)		
Output function	Lamp lighting on abnormal operation. Alarm signal output (open collector output)		
Usage environment	Temperature: 5 ~ 40 deg C, Humidity: 5 ~ 80% (no condensation allowed).		
External dimensions (mm)	210(W) x 250(D) x 107(H) (D: excluding projections, H: including rubber feet)		
Weight	Around 3.6kg		
Accessories	Manual (Installation & Operation), Power supply cord, Output cord (but only in case of the vibration unit without output cord).		
Option	I/O cable (for interface connector connection)		

6-2. Vibration unit specifications (general)

Generator model	WSC75	WSC130	WSC160
Nominal generation frequency	75kHz	130kHz	160kHz
Power type	Standard		
Q'ty of BLT	18 pcs.		
Max. allowed input power	600W		

6-3. Standard dimensions of vibration units

Type	Vibration plate type			Immersible type		
Power type	Standard			Standard		
Nominal generation frequency	75kHz	130kHz	160kHz	75kHz	130kHz	160kHz
External dimensions (mm) (excluding projections)	(W)×(D)	390×240			350×200	
	(H)	(80)	(80)	(57)	100	100 75
Thickness of the vibration plate surface	2.5mm					
Material	Vibration plate: SUS304 Gasket: EPDM (3t)			Casing: SUS304		
Vibration unit cord	1m			2.5m (including 2m braded hose)		
Max. liquid temperature	100 deg C			80 deg C		
Approx. Weight	10kg	10kg	8kg	14kg	14kg	11kg

*() are the height dimensions including necessary clearance.

6-4. Power supply cord

Electrical cable: VCTF 2.0mm² x 3 cores, 3.5m
Terminal #1: wire color = Green, protective earth terminal.
Terminal #2: wire color = Black, power supply terminal.
Terminal #3: wire color = White, power supply terminal.

6-5. Output cord

Electrical cable: VCT 2.0mm² x 2 shield cores, 3.5m.
Terminal A: connected to shield, GND.
Terminal B: wire color = Black, vibration unit [-].
Terminal C: wire color = Red, vibration unit [+].
Terminal D: no connection.

6-6. I/O cable (option) (For interface connector connection)

Electrical cable: MVVS 0.3mm² x 4 shield cores, 5m.
Terminal #1: cable color = Black, common GND (emitter).
Terminal #2: cable color = White, operation ON/OFF control.
Terminal #3: cable color = Red, alarm signal output (collector).
Terminal #4: cable color = Green, no function (collector).

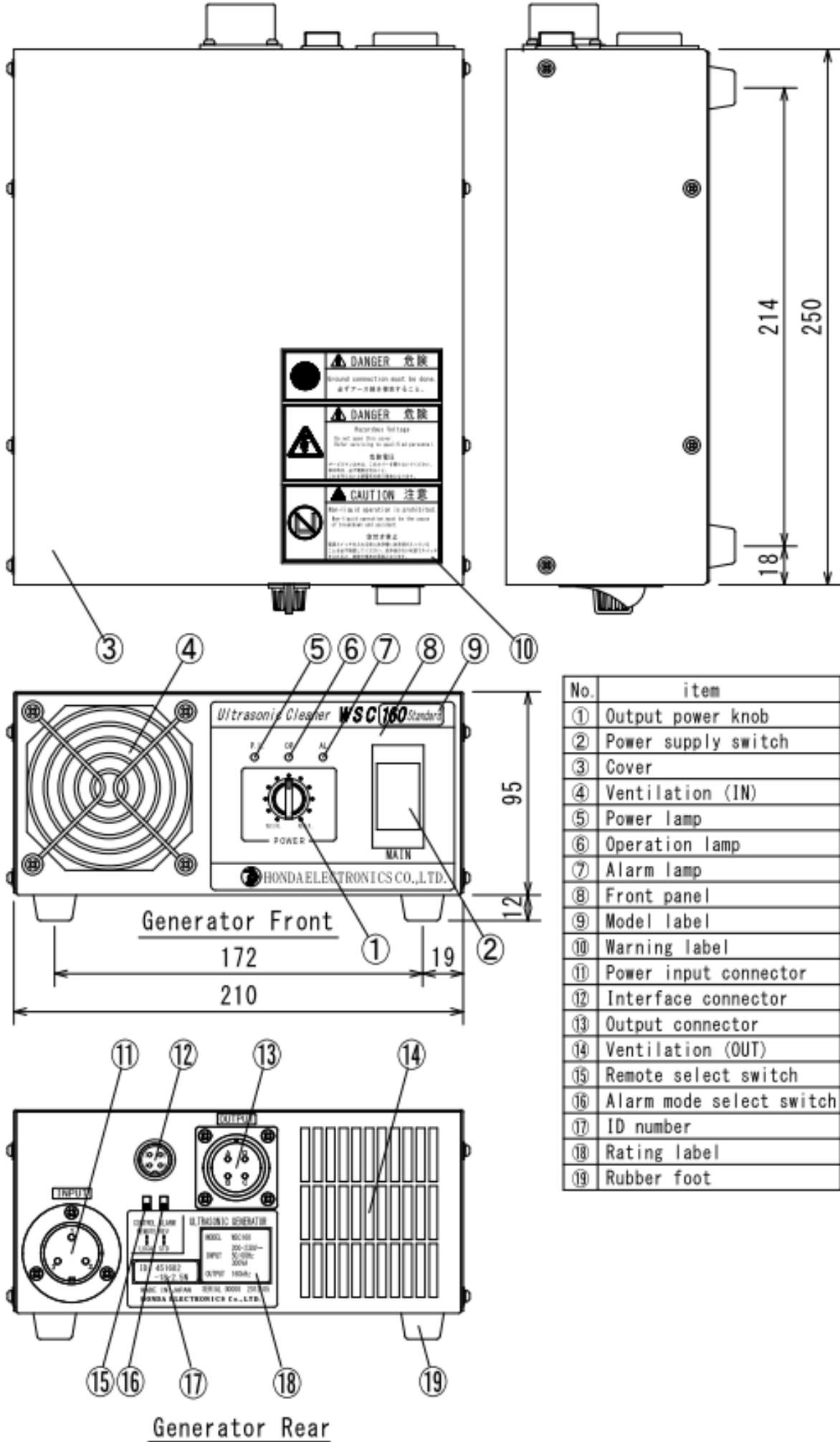
7. Precautions

⚠ DANGER	When the warning messages are not observed, there could be serious injury or even death.
<ul style="list-style-type: none">- Person with a pacemaker shall not use the equipment.- Power supply switch or power supply plug must not be handled with wet hands.- All liquids which could catch fire or explode such as thinner and benzene must not be used as cleaning liquid.- The equipment must be used at a safe place without flammable gas or explosive gas.	

⚠ WARNING	When the warning messages are not observed, there is a possibility of serious injury or even death.
<ul style="list-style-type: none">- Cover or screws of generator must not be removed by anyone but only by our designated service staffs. Touching internal sections of generator is very dangerous and shall be a cause of trouble.- Generator and connection part of electrical cable must be placed where has no wet or splash.- Cables and cord must be kept dry during the operation, otherwise it shall be a cause of burning out.- Avoid vibration unit cord and power supply cord from damages. If damaged, it shall be replaced with new one.- Keep away the equipment from the acidic or corrosive liquid.- The cleaning objects exceeding 10kg in weight should be lifted by 2 or more people or by a hoist. Pay much attention not to drop the cleaning objects and not to suffer from lower backache.- Have adequate understanding about characteristics and safety cautionary items of cleaning liquid and waste liquid. Be informed about emergency measures when making contact with the liquid or when accidentally swallowing the liquid.- During the operation, hands or fingers must not be put directly into the cleaning liquid because there is a possibility for hurting joints. If hands or fingers are needed to put into the cleaning liquid in order to perform works, thick rubber gloves shall be worn with your hand.- When the following phenomena occur during power ON or operation, immediately cut off the power supply and contact us or our agent.<ul style="list-style-type: none">- Abnormal noise, heat or smoke occurs.- AL. lamp (alarm, red color) lights up.- P.L. lamp (power, green color) does not light up.- No ultrasonic generation sound during the operation.- The power switch quickly turns off by itself.- When the following cases happened, immediately cut off the power supply and contact us or our agent.<ul style="list-style-type: none">- Water or liquid is on the generator.- Electricity can be felt when touching the equipment.	

⚠ ATTENTION	When the warning messages are not observed, there is a possibility of breakdown of the equipment itself or abnormal performance.
<ul style="list-style-type: none">- Vent of generator shall be cleaned up periodically. Particles and dust adhering to vent shall interrupt ventilation, which shall be a cause of trouble due to temperature rise inside generator.- Generation must not start with empty cleaning tank, otherwise it shall be a cause of breakdown of the vibration unit.- Cleaning objects shall be placed evenly above the vibration unit inside cleaning tank during operation. Placing cleaning objects unevenly shall be a cause of shortened service life time or breakdown of the vibration unit.- Must take care so that the cleaning objects shall not touch the surface of the vibration unit directly.- Foreign matters covering the surface of the vibration unit shall be cleaned up.	

8. External view (Generator)



9. Trouble shooting

Troubles	Confirmation items	Countermeasures
Operation does not start after turning ON.	If the power is supplied or not.	Supply the power correctly.
	If the connection of cord or cable to be connected to the generator are loose or not.	Connect cords and cable correctly.
	If the remote select switch is switched to REMOTE, and between 1 & 2 of interface connector is opened or not.	Switch the remote select switch to LOCAL, or to short-circuit between 1 & 2 of interface connector.
Generation ON/OFF control is not workable.	If the remote select switch is switched to LOCAL or not.	Switch the remote select switch to REMOTE.
Electricity can be felt, when touching the equipment.	If the earth wire is correctly connected or not.	Connect the earth wire correctly.
	If water or liquid is on the generator or not.	Wipe the water or the liquid away, and to require inspection of us or our agent.
	If the equipment is placed at the humid location or not.	Move the equipment to the low humidity location.
Power output is weak.	If the power output knob is set to MIN or not.	Adjust the knob to increase the power output.
	If the water level interrupts proper power output or not.	Adjust the water level.
Generator becomes hot abnormally	If clearance around vent is enough for ventilation or not, and if particles and dust adhere to vent or not.	Stop the operation to make the generator cool down. If this trouble could not be solved even after cool down the generator, the inspection should be required of us or our agent.
Operation is stopped with lighting up of alarm lamp.	If the generator becomes hot abnormally or not.	Connect the vibration unit correctly Inspect if cable connection is correct or not.
	If the vibration unit is disconnected or not.	
	If the vibration unit is short-circuited or not.	
Alarm lamp is blinking.	If the cleaning object is too close to the surface of the vibration unit or not. Or, if the liquid level is too low or not.	Rearrange the position of the cleaning object inside cleaning tank, or to re-adjust the liquid level. If this trouble could not be solved even after the rearrangement or readjustment, there is a possibility of deterioration of the vibration unit. Inspection should be required of us or our agent.

10. Warranty
10-1. Warranty period
> Warranty period is either 1 year from the B/L(or AWB) date or 2,000 operating hours, whichever comes first.



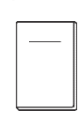
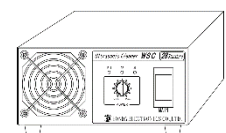
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Instruction manual

(Installation)



Ultrasonic Cleaner
WSC28 / WSC40 / WSC75
WSC130 / WSC160

Contents

Generator	1 unit
Vibration unit	1 unit
Power supply cable (3.5m) 3P	1 pc
Output cable (3.5m) 4P	1 pc
Instruction manual (Installation & Operation)	1 set each

Option

I/O cable (5m) (For generation ON/Off control and alarm signal output)	1 pc
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Generator

Instruction manual

3P

4P

Power supply cable

Output cable

Vibration unit

Immersible type or vibration plate type

I/O cable (Option)

1. Installation of generator

1-1 Place of installation

- > Generator must be put on a flat place.
- > At the front and the rear of generator, clearance for operation, wiring and ventiation are necessary at least for 150mm each.
- > In case of installation in a closed space, equipment for forced ventilating/cooling of generator is necessary.
- > Generator can be stacked vertically up to 4units.
- > Generator must be used indoors.
- > Must not be installed at following locations;
 - With flammable, explosive or corrosive gases.
 - With wet, splash or vapor.
 - With plenty dusts or oil mists.
 - With vibrations or impact shocks.
 - Close to equipment which emits strong electrical noise.
 - With direct sunlight or heating appliance.

1-2 Switches on rear panel

- > Remote select switch shall be switched to [LOCAL] on rear panel, when I/O cable is not used.
- > When I/O cable is used, after-mentioned [5. External Connection] should be referred.

2. Power supply connection

2-1 Power supply

- > The voltage of power supply is 1-Phase AC200V ~ 230V (fluctuation tolerance +/-10%), and the electric current is 3A per unit (Standard-type's electric current is 1.5A).
- > Installation and wiring works must be engaged by the certified person in full safety, after the power supply was surely shut down.
- > The power supply must not be opened till all installation and wiring works finished.

2-2 Installation of earth leakage breaker

- > To power supply, 1 unit of earth leakage breaker must be installed, whose spec. is with more than 5A rated current and 30mA earth leakage sensed current.

2-3 Wiring of power supply cable

- > Power supply White and Black cable shall be connected to the earth leakage breaker installed.
- > Power supply Green cable shall be connected to an earth terminal (earth resistance value = 100 ohm and under) which was treated as D-class earthing.
- > When several units of generator are installed, each generators' power supply Green cables must be directly connected to earth

terminals one by one.

- > Thickness of cable for earth terminal shall be correctly chosen according to the total volume of generators' spec connected.
- > Connector of power supply cable shall be connected to the plug of power input on rear panel of the generator.

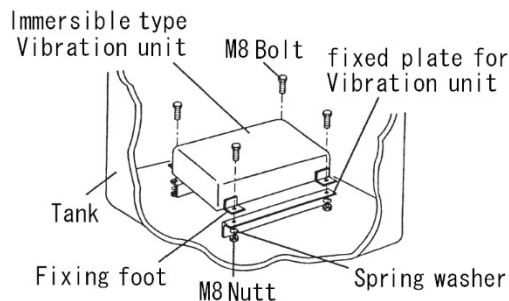
3. Installation of vibration unit

3-1 Precautions

- > In order to avoid from electrical shock caused by electrical storage in ceramic elements, terminal #1 and #2 of vibration unit should be short-circuited to discharge before wiring works.
- > Clearance between the surface of vibration unit and the liquid level shall be 100 mm and over.
- > Clearance between the surface of vibration unit and cleaning objects shall be at least 50 mm.
- > In case that cleaning objects' shape is flat and its surface is parallel to the surface of vibration unit, clearance between the surface of vibration unit and the cleaning objects shall be 100 mm and over.
- > Metal part of cleaning tank must be connected to an earth terminal (earth resistance value = 100 ohm and under) which was treated as D class earthing.

3-2 Installation of immersible type vibration unit (standard type)

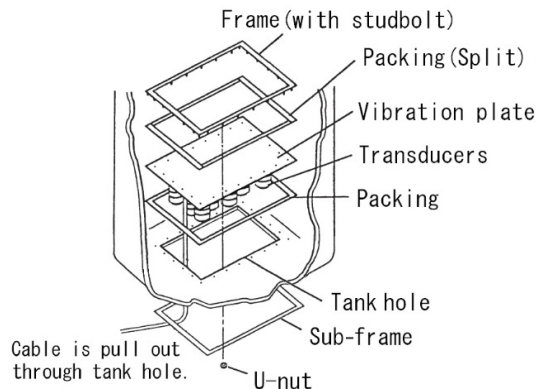
- > Holes (10 mm dia.) shall be made on metal fixtures of cleaning tank according to the right position of metal fixtures of vibration unit to fix.
- > Vibration unit shall be fixed onto the cleaning tank with M8 bolts, spring washers and nuts (its materials should be properly selected according to the materials of cleaning liquid and tank, and be prepared by users).



- > The cut end of braided hose connecting to vibration unit shall be kept dry and outside of cleaning liquid.
- > The cut end of braided hose shall be kept away from liquid or humid surround. Liquid coming inside or condensation inside shall be a cause of trouble.
- > Cable of vibration unit, braided hose etc. must not be strongly tensed. It shall be a cause of trouble.
- > Braided hose must not be bent till 135R and under. It shall be a cause of disconnection or liquid leakage.

3-3 Installation of vibration plate type unit (for example)

- > A square hole shall be opened and round holes (6.3 mm dia. or 6.5 mm dia.) shall be made on the bottom face of cleaning tank to fix vibration unit.



- > Vibration unit shall be installed to the bottom face of the cleaning tank, as shown.

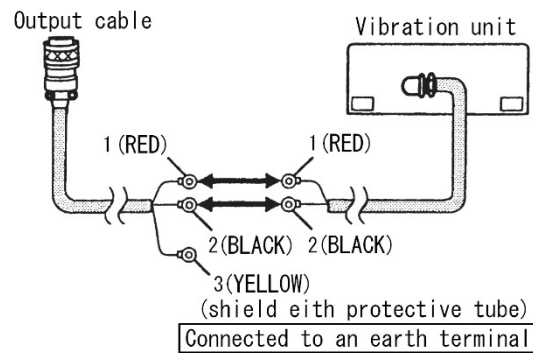
(Installation method is not always as seen above and it shall depend on the spec of vibration unit.)

- > A retainer frame shall be placed from the underside of the cleaning tank and be fixed with U-nuts enough strongly.
- > Cable of vibration unit must not be strongly tensed. It shall be a cause of trouble.
- > Cable of vibration unit must be installed so that it shall be always kept away from liquid even during operation. Operation with the cable containing liquid shall make damages against the cable and burn out at the worst case.

4. Connection of vibration unit

4-1 Connection of vibration unit and output cable

- > The cable of vibration unit and the output cable (terminal 2R-5) of generator shall be connected with a terminal box, as shown.
- > Cable terminal #3 (shield) and metal part of cleaning tank (with vibration unit) must be connected to an earth terminal.



- > The earth terminal shall be with earth resistance value = 100 ohm and under and be treated as D class earthing.
- > Cable of vibration unit and output cable must be connected with a terminal box (600V-20A and over), and be protected from humidity, dusts, etc.
- > Direct connection of cables using tape (without a terminal box) is prohibited, because it shall be a cause of electrical shock.
- > Connection of cables shall be as shown. Otherwise, mis-connection shall make troubles and fires.

4-2 Connection of output cable

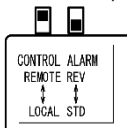
- > Output cable shall be connected to the plug of high frequency output on rear panel of the generator.
- > Turning ON of a generator without connection of output cable shall be a cause of trouble. Power switch of the generator must be turned ON after connection of output cable and supply of liquid into cleaning tank.

5. External connection

- > I/O cable shall be used for external connection to the generator. Connector of I/O cable shall be connected to the plug of interface connector on rear panel of the generator.
- > In order to avoid from improper operation, I/O cable must not be bundled with other cables (power supply, output cables and etc.).
- > Available functions are as follows;
 - Generation ON/OFF remote control.
 - Alarm signal output.

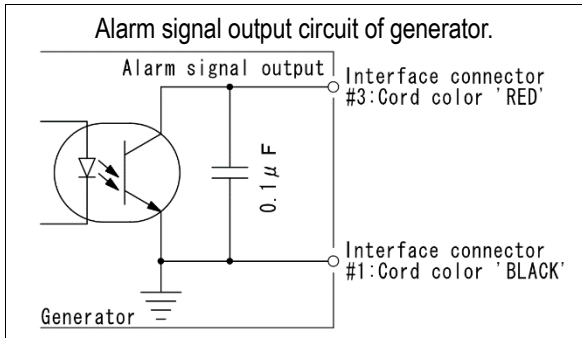
5-1 Generation ON/OFF remote control

- > Remote select switch shall be switched to [REMOTE] on rear panel.
- > Generation ON/OFF remote control shall be available by short-circuiting and opening of I/O cable White and Black (1 circuit only per 1 unit is available).
 - Short-circuiting of White and Black --- ON
 - Opening of White and Black --- OFF(Refer to [5-3 Remote select switch].)



5-2 Alarm signal output

- > Condition of generator can be outputted on conduction of I/O cable Red and Black.
 - <In case that alarm mode select switch is set at [STD]>
 - Normal condition --- Red and Black are conducted.
 - Abnormal condition --- Red and Black are not conducted.(Power supply OFF and cable breaking both are abnormal conditions.)
- > Output circuit is open-collector.
- Should take note of polar character.



- > Alarm action can be changed by alarm mode select switch on rear panel of generator.
- (Refer to [5-4 Alarm mode select switch].)

5-3 Remote select switch

Remote select Switch	Action
REMOTE	To control ON/OFF of generator by connecting of I/O cable.
LOCAL	To turn ON to start operation and OFF to stop operation.

Short-circuiting and opening of I/O cable White and Black can control ON/OFF of generation, after switched to [REMOTE].

Control method in case of remote select switch at [REMOTE].	
White-Black	Operation
Short-circuit	ON
Open	OFF

5-4 Alarm mode select switch

Alarm mode select Switch	Red-Black Condition		
	Normal	Abnormal	Power Supply OFF
REV	Open(H)	Short-circuit(L)	Open(H)
STD	Short-circuit(L)	Open(H)	Open(H)
note	Condition can be changed by switch.		Always open when power supply OFF.

* On selection of REV, power supply OFF and cable breaking both are not abnormal condition.

5-5 I/O cable terminal #, cord color and connection specifications

Connector Terminal#	Cord Color	Remarks
1	Black	Common GND (same electrical potential to chassis)
2	White	Generation ON/OFF control
3	Red	Alarm signal output
4	Green	No function

5-6 Specifications of interface connector input-output

> Terminal# 1: GND

Common GND for Terminal# 2, 3 and 4.

> Terminal#2: Generation ON/OFF control

Generation ON/OFF can be controlled by short-circuiting and opening with GND.

(Short-circuit = Generation ON, Open = Generation OFF)

To GND, output is around 4V and short-circuited current is around 10mA.

> Terminal#3: alarm signal output (open collector output).

Available applied voltage: 50V and under

(24V and under is recommended).

Short-circuited energized current:

8 ~ 30mA (referential value).

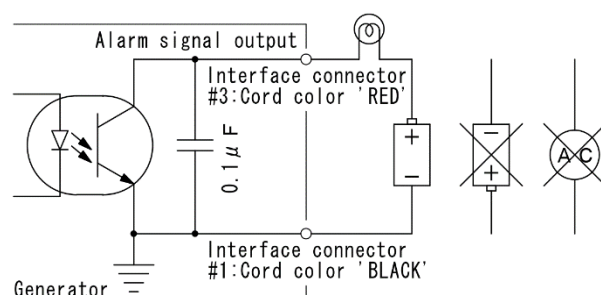
> Terminal#4: Spare output (open collector output).

Electrical specification is the same as that of Terminal# 3.

(Currently Terminal# 4 has no function).

5-7 External control connection (examples)

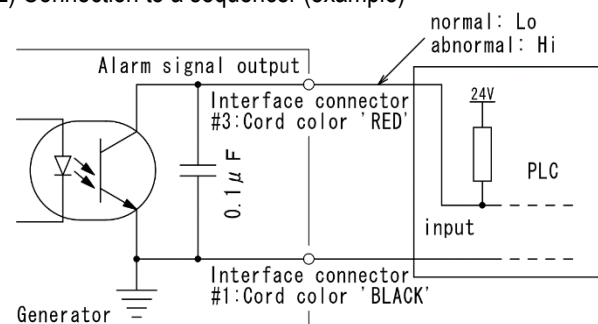
(1) Lamp shall light up in case of normal, and shall extinguish in case of abnormal.



Power supply shall be connected according to the polar character as shown.

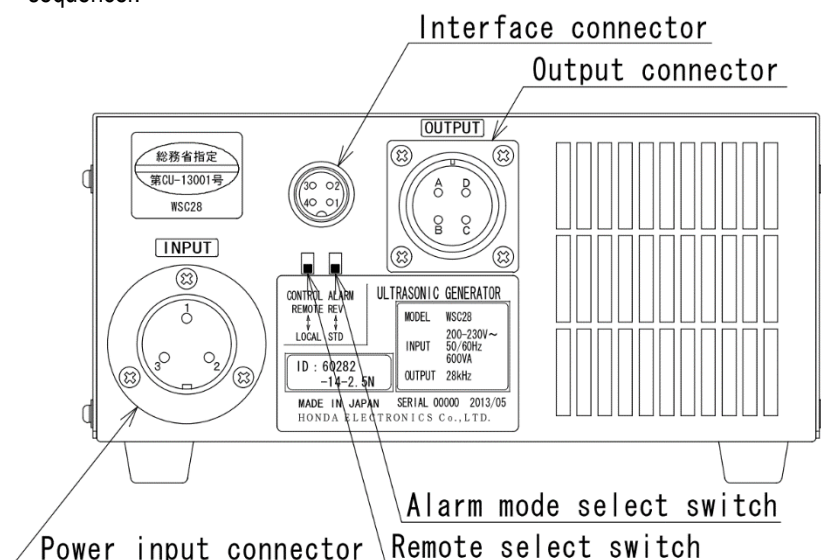
Reverse voltage or connection of AC shall be a cause of trouble.

(2) Connection to a sequencer (example)



This is just a reference.

Connection shall follow the instruction manual of the sequencer.



6. Precautions



When the warning messages are not observed, there could be serious injury or even death.

- Persons with a pacemaker shall not use the equipment.
- The equipment is not explosion-proof. The equipment must be installed in a safe place without flammable gas, explosive gas, vapor or plenty dusts.
- Installation and wiring works must be engaged surely after the primary-side power supply was shut down.



When the warning messages are not observed, there could be slight injuries or damage to other material properties.

- The power-supply voltage of the equipment is 1-Phase AC200V ~ 230V, and other kind of power supply must not be applied.
- Power supply cable and output cable must not be bent till 30R and under.
- Single wire cable must not be bent till 10R and under.
- Braided hose of immersible vibration unit must not be bent till 135R and under.
- The material of the packing must be selected to be suitable for the kind of liquid to be used, otherwise it shall be a cause of liquid leakage.



When the warning messages are not observed, there is a possibility for serious injury or even death.

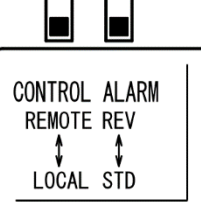
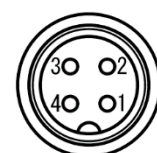
- Earth leakage breaker shall be installed on power supply's side.
- Protective earth conductor, shield cable of output cable and metal part of cleaning tank all shall be connected to earth terminal.
- Cover or screws of generator must not be removed by anyone but only by our designated service staffs. Touching internal sections of the generator is very dangerous and shall be a cause of trouble.
- In order to avoid from electrical shock caused by electrical storage in vibration unit, plus terminal and minus terminal of vibration unit should be short-circuited to discharge before wiring works or maintenance works.
- Generator must be used indoors.
- Generator is not water-proof, so must be placed where has no wet or splash.
- High voltage is usually applied to ceramic elements and connecting part of cables of vibration unit, so those must not be touched by operator and must be kept away from wet.
- Cables must be kept dry during operation, otherwise it shall be a cause of burning out.
- Cables must not be twisted or exposed to strong force, and should have external protection if necessary.
- Cables and terminals must not be modified. Such modification shall be a cause of trouble because high frequency and high voltage are applied.
- Must avoid cables of vibration unit and power supply from damages. If damaged, it shall be replaced with new one.
- Must use only cables of vibration unit and power supply which were originally equipped.
- Cables of vibration unit and power supply must not be coiled, otherwise it shall be a cause of noise or heat.
- The cable of vibration unit and the output cable shall be connected with a terminal box (the rated voltage 600Vmrs and over, and the rated current 20Arms and over)
- The equipment must not be installed where acidic gas or corrosive gas are around.



When the warning messages are not observed, there is a possibility for breaking down of the equipment itself or abnormal performance.

- The vibration unit to be connected to the generator must have the same ID number of the generator. Connecting a vibration unit to a generator with a different ID number shall be a cause of improper operation or trouble.
- Only 1 circuit of external control terminal is available for 1 unit and it must not be connected with other circuits in parallel or in series, otherwise it shall be a cause of improper operation.
- Control cables must not be placed with or bundled with power supply cables or output cables of generator, otherwise it shall be a cause of improper operation due to noise.
- In case that external control or alarm output operated improperly, condenser (250V/0.1~1microF) should be connected in parallel to signal input-output terminal of control unit (sequencer and etc.).
- Generator must be kept away from direct sunlight or heating appliance to avoid from troubles caused by ambient high temperature or high humidity.
- Must not be installed at place with plenty dusts.
- Vibration plate type unit installed on the wall or close to the liquid level of the cleaning tank must always be below the liquid level. In order to ensure this, a float switch and a liquid level gauge should be installed onto the cleaning tank to control the liquid level.
- This equipment must not be operated with empty cleaning tank, otherwise it shall be a cause of breakdown of the vibration unit.
- Cleaning objects shall be placed evenly above the vibration unit inside cleaning tank during operation. Placing cleaning objects unevenly shall be a cause of shortened service life time or breakdown of the vibration unit.
- Must take care so that the cleaning objects shall not touch the surface of the vibration unit directly.
- Output power should be adjusted depending on the condition of reflection of ultrasonic, otherwise it shall be a cause of shortened service life time.

Enlarged fig. of switches



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